# Hoopeston Wind, LLC

**Vermilion County, Illinois**

# Habitat Conservation Plan for the Indiana Bat and the Northern Long-Eared Bat

Hoopeston Wind Project
Vermilion County, Illinois

October 21, 2016

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# 1.0 Introduction

## 1.1 Applicant Information

The Hoopeston Wind project (Project) is owned by Hoopeston Wind, LLC (Hoopeston Wind), a wholly owned subsidiary of IKEA Energy US, LLC. The Project is managed by Apex Wind Asset Management, LLC, a subsidiary of Apex Clean Energy Holdings, LLC (Apex).

## 1.2 Background and Purpose

In August 2007, Illinois enacted legislation (Public Act 95-0481) that establishes annual benchmarks for renewable energy generation and energy efficiency.[1] Under this program, electric utilities in Illinois are required to provide at least 25% of their retail electric supply from renewable energy sources, including wind, by 2025. Illinois's renewable portfolio standard (RPS) requires that investor-owned electric utilities (EUs) obtain a minimum of 75% of their renewable energy obligation from wind power and the remaining amount (25%) from other eligible renewables. For alternative retail electric suppliers (ARES), a minimum of 60% of their renewable energy obligation must come from wind power, and the remaining amounts (40%) from other eligible renewables. For EUs, through 2011, eligible renewable resources were required to be located in-state. After 2011, equal preference has been given to resources within Illinois and adjoining states as long as they are cost effective. Given the clear legislative objectives of the state of Illinois for increased renewable energy generation, the majority of which must be met by wind energy, Hoopeston Wind has developed the Project, which began operations in March 2015.

Wind energy has grown significantly across the U.S. and within Illinois over the past several years. By 2020, 20% of our nation's energy could come from wind energy. In Illinois alone, the target for renewable energy is 25% (75% of that from wind) by 2025. These targets for renewable energy have been established to promote energy independence, environmental stewardship, and economic development. Wind energy generation is emissions free, requires little to no water, changes only a minimal portion of existing land use, and reduces the need for other traditional energy sources and thereby reduces associated harmful emissions. As an example, current installed capacity in Illinois will avoid emission of over 4.7 million metric tons of carbon dioxide annually. In 2012, wind energy became the number one source of new electricity generating capacity in the U.S., providing 42% of all new capacity. According to the American Wind Energy Association (AWEA), at the end of 2014, the U.S. had nearly 48,000 operating turbines representing 65,877 megawatts (MW), and providing 4.4% of the country's electricity. Wind is a clean and renewable fuel source that helps keep energy prices low, providing a hedge against volatile fossil fuel price fluctuations. Combined with the increased efficiency through advances in wind turbine technology, wind is now one of the most cost effective sources of new electricity generation.

In addition to the environmental and market benefits from wind, significant direct and indirect economic benefits are realized in areas where such projects are developed. A large number of construction jobs are created during construction as well as a significant number of long term operations and maintenance

[1] http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=IL04R&re=1&ee=1

(O&M) and environmental monitoring jobs. There are significant direct payments made to participating landowners, and this often increases local spending, which makes its way through the wider community. Another direct benefit to the broader community is the significant increase in tax revenue associated with wind energy projects greatly benefiting schools, fire and water departments, and other municipal services.

Beyond the local project areas, wind energy also supports a growing supply chain and manufacturing base. There are now more than 500 wind energy-related manufacturing facilities across the U.S. Thirty-six of those facilities are located in Illinois, supporting over 1,000 employees. Hoopeston Wind created the equivalent of 100 full time jobs during the construction phase and will employ up to 10 permanent positions at the local O&M facility for the life of the Project. While job creation and increased economic development activity are welcome by-products of renewable energy projects, the paramount benefit of continued careful development of responsibly sited wind energy projects is meeting our energy needs in a way that minimizes the overall environmental impact of our nation's energy footprint.

## 1.3 Habitat Conservation Plan Contents

This Habitat Conservation Plan (HCP) has been prepared in accordance with the requirements set forth under section 10(a)(1)(B) of the Endangered Species Act (ESA), as amended, and applicable U.S. Fish and Wildlife Service (USFWS) guidance document. The HCP has been prepared in order to manage risk associated with protected species, particularly during the operation of the Project. The Project's location is within the range of the Indiana bat (*Myotis sodalis*), a species listed as endangered under the ESA. Estimates of the size of hibernating populations of the Indiana bat vary across the state of Illinois. Maternity colonies have been recorded in 20 Illinois counties, including one colony in Vermilion County (USFWS 2007). The Project's location is also within the range of the northern long-eared bat (*Myotis septentrionalis*), a species listed as threatened under the ESA. There are 21 known northern long-eared bat hibernacula in Illinois (USFWS 2015a).

Under section 10 of the ESA, applicants may be authorized, through issuance of an Incidental Take Permit (ITP), to conduct activities that may result in take of a listed species, as long as the take is incidental to, and not the purpose of, otherwise lawful activities. Hoopeston Wind is applying for an ITP to authorize any incidental take of the Indiana bat or northern long-eared bat that may occur as a result of the activities that are proposed for coverage under the ITP.

Before the USFWS issues an ITP to Hoopeston Wind, USFWS must find that the applicant proposes measures to avoid, minimize, and mitigate the potential take of the Indiana bat or the northern long-eared bat to the maximum extent practicable. Hoopeston Wind has prepared this HCP to support the issuance of an ITP for Indiana and northern long-eared bats during the operation and decommissioning of the Project pursuant to Section 10(a)(1)(b) of the ESA. Specifically, this HCP provides the following:

- An overview of the regulatory framework of wind projects as it relates to species protection, including a summary of agency coordination;
- A discussion of the general environmental setting and biological resources within the Project Area;

- A description of the Project, including its purpose and a definition of activities to be covered under the HCP; alternatives considered; and public participation;
- A discussion of the life history and presence of the Indiana bat;
- A discussion of the life history and presence of the northern long-eared bat;
- Potential effects of the proposed action, including alternatives for minimizing risk to Indiana and northern long-eared bats;
- Estimates of the Project's take, and context defining the significance of the potential take relative to each species' overall population viability; and
- A Conservation Plan, outlining measures to avoid, minimize and mitigate potential take; conduct post-construction monitoring for effectiveness; and implement adaptive management measures as appropriate.

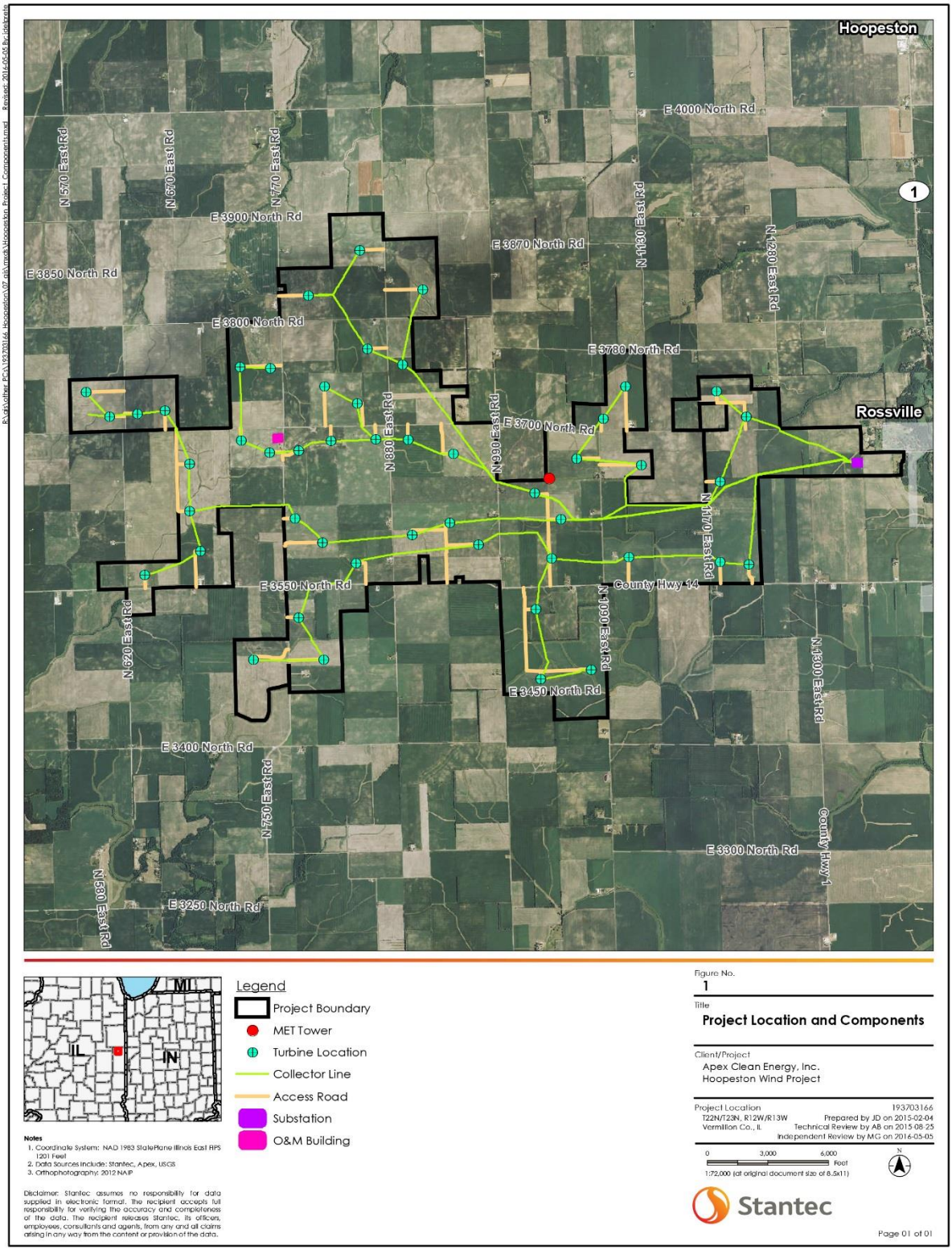
As part of the requirements for the issuance of an ITP, Hoopeston Wind has prepared this HCP to identify those actions that will avoid, minimize and mitigate the effects of covered activities on the Indiana and northern long-eared bat and their habitats.

# 2.0 Background

## 2.1 Overview

The Hoopeston Wind Project is a modern wind facility located in Vermilion County, Illinois. The Project is designed to generate approximately 98 MW with 49 2.0 MW wind turbine generators. The Project includes an O&M building, access roads, an underground electrical collection line system, a substation, and one permanent meteorological (met) tower. The Project is approximately 20 miles (mi) north of Danville, Illinois, and the 49 turbines are interspersed across active farmland west of Highway 1 and east of Highway 49, west of Rossville and southwest of the town of Hoopeston. The Project location and facilities are presented in Figure 1.

## Figure 1: Project Location and Facilities



## 2.2 Permit Duration

Hoopeston Wind is seeking an ITP with a 30-year term. This is based on the expected life of the Project components. At the expiration of the 30-year term, the ITP may be renewed or extended with the approval of the USFWS.

## 2.3 Regulatory and Legal Framework

### 2.3.1 Endangered Species Act

Section 9 of the ESA prohibits the "take" of any fish or wildlife species listed under the ESA as endangered. Under federal regulation, take of fish or wildlife species listed as threatened is also prohibited unless otherwise specifically authorized by regulation. "Take," as defined by the ESA, means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect a listed species, or attempt to engage in any such conduct" [ESA §3(19)].

Section 9 of the ESA also prohibits the removal and reduction to possession of any listed plant species "under federal jurisdiction," as well as the removal, damage, or destruction of such plants on any other areas in knowing violation of any state law or regulation or in violation of state trespass law.

The 1982 amendments to the ESA established a provision in section 10 of the ESA that allows for "incidental take" of endangered and threatened species of wildlife by non-federal entities. Incidental take is defined by the ESA as take that is "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity" [50 code of federal regulations [CFR] §402.02]. Under this provision, the Secretary of the Interior and Secretary of Commerce may, where appropriate, authorize the taking of federally listed fish or wildlife if such taking occurs incidentally to otherwise legal activities. The USFWS was charged with regulating the incidental taking of listed species under its jurisdiction.

Section 10 of the ESA establishes a program whereby persons seeking to pursue activities that otherwise could give rise to liability for unlawful "take" of federally protected species, as defined in section 9 of the ESA, may receive an ITP, which exempts them from such liability. Under section 10 of the ESA, applicants may be authorized, through issuance of an ITP, to conduct activities that may result in take of a listed species, as long as the take is incidental to, and not the purpose of, otherwise lawful activities.

The submission of an ESA section 10(a)(1)(B) permit application requires the development of an HCP (16 United States Code [USC] §1539(a)(1)(B) and 1539(a)(2)(A)) designed to ensure the continued existence and aid in the recovery of the listed species while allowing for any limited, incidental take of the species that might occur during the construction and operation of a project.

### 2.3.2 National Environmental Policy Act

The National Environmental Policy Act (NEPA) of 1969, as amended, requires federal agencies to evaluate and disclose the effects of their proposed actions on the natural and human environment. The NEPA process is intended to help federal agencies make decisions that are based on an understanding

of potential environmental consequences, and take actions that protect, restore, and enhance the environment. NEPA regulations provide the direction to achieve that purpose. The issuance of an ITP by the USFWS constitutes a federal action subject to NEPA compliance and review (42 USC §§4321-4347, as amended).

NEPA and the Council for Environmental Quality (CEQ) *Regulations for Implementing NEPA* (40 CFR 1501) contain "action-forcing" provisions to ensure that all federal agencies act according to the letter and spirit of NEPA. NEPA procedures must ensure that environmental information is available to public officials and citizens before decisions are made and before actions are taken. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA. NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail.

To evaluate the environmental effects of a proposed action, the USFWS typically prepares and provides for public review an Environmental Assessment (EA). If the USFWS finds that significant impacts to the natural and human environment are not expected as a result of the proposed action, then a Finding of No Significant Impact (FONSI) is issued. If significant impacts are anticipated, then a comprehensive Environmental Impact Statement (EIS) is prepared and distributed for public review. After the USFWS completes its review of an EIS, it issues a Record of Decision of its findings. The USFWS can issue an ITP only after the NEPA review process has been completed.

### 2.3.3 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA, 16 USC §§703-712) prohibits the taking, killing, injuring, or capture of listed migratory birds. Neither the MBTA nor its implementing regulations found in 50 CFR Part 21 provide for the permitting of “incidental take” of migratory birds that may be killed or injured by wind turbines. The USFWS has and continues to provide wind developers guidance in making a good-faith effort to comply with the MBTA, as discussed in the final Land-Based Wind Energy Guidelines (LWEG; USFWS 2012a).

The Project has created a Bird and Bat Conservation Strategy (BBCS) to address impacts to migratory birds and to outline minimization measures and adaptive management strategies in place for these species.

### 2.3.4 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) of 1940 (50 CFR 22.26), and its implementing regulations, provide additional protection to bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) such that it is unlawful to take an eagle. In this statute the definition of “take” is to “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb.” The term “disturb” is defined in regulations found at 50 CFR 22.3 to include “to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available: (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or

sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

## 2.4 Covered Lands

The Covered Lands for this HCP are defined as the Project Area, which is shown in Figure 1 and is considered to be the outermost boundary of the participating landowner property (project boundary). The Project Area contains approximately 8,884 acres (3,595 hectares [ha]). The requested ITP will cover the entire Project Area.

## 2.5 Covered Species

### 2.5.1 Indiana Bat

The range of the federally endangered Indiana bat includes the eastern and mid-western U.S., from Iowa, Oklahoma, and Wisconsin, northeast to Vermont, and south to northwestern Florida and northern Arkansas (USFWS 2007). The majority of the wintering population occurs in the limestone cave regions of Indiana, Kentucky, and Missouri.

Indiana bat maternity colonies are historically known from Vermilion County (USFWS 2007) and continue to be documented as recently as 2014 (Illinois Department of Natural Resources [IDNR] 2015). Maternity colonies are also known from Ford County, located adjacent to Vermilion County to the northwest (USFWS 2007, IDNR 2015). Recent records include a July 2010 survey that identified an Indiana bat maternity colony on the Middle Fork of the Vermilion River in Ford and Champaign counties (IDNR 2010), which was confirmed again during surveys in 2014 (IDNR 2015). The closest known hibernaculum is Copperhead Mine, located in Vermillion County, Indiana, approximately 40 mi (64 kilometers [km]) southeast of the Project. Whitaker and Risler (1992) found seven Indiana bats in this mine in 1990; however, in 2014, IDNR found no Indiana bats and the mine appeared positive for white-nose syndrome (WNS; K. Shank, pers. comm.). The closest known occupied hibernaculum is Blackball Mine located in LaSalle County, Illinois, approximately 140 mi (225 km) to the northwest of the Project Area (USFWS 2007).

Acoustic monitoring surveys conducted in 2009, 2010, and 2014 indicated that overall bat activity levels within the Project Area are moderate relative to the results of acoustic bat surveys at other wind energy projects in the Midwest. The results of the acoustic bat survey identified 16 potential Indiana bat calls (0.7% of all calls) within the Project Area. The results of the acoustic surveys suggest there are not high levels of Indiana bat migratory activity within the Project Area (see Section 3.10), but the species may occasionally pass through the area. Little is known about the migration patterns of Indiana bats, specifically how and where they disperse across the landscape during migration; however, Indiana bats have been known to occur in Vermilion County, and the Project Area is located within their migratory range. Therefore, the Indiana bat does have the potential to be at risk of collision with operating turbines and is consequently considered a Covered Species in this HCP.

As a result of effective avoidance and minimization efforts by Hoopeston Wind during siting and construction, as well as similarly effective avoidance and minimization efforts during future decommissioning, operation of the Project is the only activity covered by this HCP that is expected to result in take of Indiana bats. The primary method to minimize impacts to Indiana bats, beyond the careful siting of turbines and other project features that has already occurred, will be feathering the blades (i.e., preventing them from free-wheeling) below the cut-in speed, which is the minimum wind speed at which turbines begin rotating and producing power.

### 2.5.2 Northern Long-eared Bat

The northern long-eared bat was proposed for listing under the ESA by the USFWS on October 2, 2013. A final decision was made on April 2, 2015, to federally list this species as threatened (USFWS 2015a). The northern long-eared bat's range covers much of the eastern and north central U.S., from Maine to North Carolina westward to eastern Oklahoma, Wyoming and Montana, as well as all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia. They have historically been found in greater abundance in the northeast, portions of the Midwest and southeast (USFWS 2014). Though widespread, their distribution may be patchy or irregular (Amelon and Burhans 2006). In Illinois, northern long-eared bats hibernate from November 1 through March 31, with a breeding season that lasts from April 1 through September 30 (USFWS 2014).

Northern long-eared bats hibernate in limestone caves and mines. During the spring and summer, females live in maternity colonies in hollow trees and under loose bark. They forage along forested hillsides, rivers and streams, feeding on true bugs, leafhoppers, wasps and flies.

During the 2009, 2010, and 2014 acoustic monitoring surveys, 13 potential northern long-eared bat calls (0.6% of all bat calls) were identified within the Project Area (see Section 3.10). These results do not suggest high levels of northern long-eared bat migratory activity within the Project Area. Little is known about the migration patterns of northern long-eared bats, specifically how and where they disperse across the landscape during migration; however, northern long-eared bats have been known to occur in Vermilion County, and the Project Area is located within their migratory range. The closest known hibernaculum is Copperhead Mine, located in Vermillion County, Indiana, approximately 40 mi (64 km) southeast of the Project. Whitaker and Risler (1992) found northern long-eared bats in this mine in 1990; however, in 2014, IDNR found no northern long-eared bats and the mine appeared WNS positive (K. Shank, pers. comm.). Additionally, there are 2014 records of maternity colonies along the Middle Fork of the Vermilion River in Ford and Champaign counties (IDNR 2015). Therefore, the northern long-eared bat does have the potential to be at risk of collision with operating turbines and is consequently considered a Covered Species in this HCP.

As a result of effective avoidance and minimization efforts by Hoopeston Wind during siting and construction, as well as similarly effective avoidance and minimization efforts during future decommissioning, operation of the Project is the only activity covered by this HCP that may potentially result in take of northern long-eared bats. The primary method to further avoid and minimize impacts to Covered Species beyond the careful siting of turbines and other Project features that has already occurred, is feathering the turbine blades below the cut-in speed.

# 3.0 Environmental Setting and Biological Resources

The Project Area is located in east-central Illinois along the Illinois-Indiana border. The Project Area is within the Till Plains section of the Central Lowland physiographic province (Illinois State Geological Survey 2015). This region is characterized by flat to gently rolling topography produced by glacial processes. Vermilion County is primarily agricultural, but includes small towns with residential, commercial and industrial activity, connected by a comprehensive network of local and state roads, an interstate highway, active railways, and major and minor transmission lines. Forested areas are limited to fragmented, linear tracts and small forested bands associated with larger streams in this county.

## 3.1 Land Use

Land use within the Project Area and surrounding counties is dominated by agriculture. Pasture and row crops, mostly of corn and soybeans, comprise the majority of land in Vermilion County. Other land uses in the county include: residential; urban; manufacturing; commercial; transport; recreational; and utilities. Larger urban areas include: Hoopeston, Danville, and Georgetown. Major transportation routes include: Interstate 74; U.S. Highways 136 and 150; and State Highways 1, 49, 119, and 9.

## 3.2 Topography

Vermilion County is located in parts of both the Kankakee Plain and Bloomington Ridge Plain regions of Illinois. The plains formed when the bedrock and topographic features of the region were covered by glacial till deposits during the Wisconsin glaciations 70,000 years ago (Illinois State Geological Survey 2015). The plains are crossed by several low, poorly developed end moraines, which provide the only topographic relief (Luman et al. 2015). Elevation within Vermilion County ranges from 290 to 720 feet (ft; 58 to 219 meters [m]) above mean sea level; there is even less topographic relief in the immediate area of the Project.

## 3.3 Geology

The geology of the northern half of Illinois is the product of the Wisconsin glaciations. Surficial geology is dominated by glacial deposits of sedimentary rocks, which range in thickness from 25 to 50 ft (8 to 15 m) in central Vermilion County, to 400 to 500 ft (122 to 152 m) in northern Vermilion County (Illinois State Geological Survey 2015). Bedrock within Vermilion County is diverse and includes formations of the Devonian, Mississippian, and Pennsylvanian periods (Kolata 2005). Devonian bedrock is approximately 417 to 354 million years old and consists of limestone, sandstone, and shale formations. The limestone, shale, and siltstone rocks of the Mississippian period formed approximately 354 to 323 million years ago. Pennsylvanian rocks consist of limestone, sandstone, clay, and shale and contain the bituminous coal resources of Illinois; these rocks formed approximately 323 to 290 million years ago (Illinois State Geological Survey 2015).

## 3.4 Soils

Vermilion County is comprised primarily of Drummer silty clay loam (16.5%), Ashkum silty clay loam (11.1%), Flanagan silt loam (9.6%), Elliott silt loam (8.4%), and small acreages of many other soil types. Most of the soils in the county are hydric. The Ashkum, Drummer, and Elliott series are prime farmland if drained. The Flanagan series is prime farmland. Most of the smaller acreage soils in the county are prime farmland, farmland of statewide importance, or prime farmland if drained (United States Department of Agriculture [USDA]-Natural Resource Conservation Service [NRCS] 2015).

The Drummer series consists of very deep, poorly drained soils formed in loess or other silty material and in the underlying loamy stratified outwash on nearly level or depressional parts of outwash plains, stream terraces, and till plains. The Ashkum series consists of very deep, poorly drained soils on till plains. They formed in colluvial sediments and in the underlying silty clay loam till. The Flanagan series consists of very deep, somewhat poorly drained soils that formed in loess or other silty material and the underlying loamy calcareous till on till plains. The Elliott series consists of very deep, somewhat poorly drained soils on till plains that formed in loess or other silty material and in the underlying silty clay loam till (USDA-NRCS 2015).

## 3.5 Hydrology

The Project Area encompasses an area within the watershed of several rivers in Illinois. The Project Area is in the Vermilion (Wabash Basin) watershed. A small area in the northwestern part of Vermilion County is within the Iroquois watershed, the southern portion of the county is in the Wabash River Valley watershed, and the southwestern corner is within the Embarras watershed (McConkey et al. 2011).

Small, intermittent streams and drainages are common within the Project Area. A few perennial streams also occur within the Project Area, including Bluegrass Creek and Fountain Creek. Larger waterways that are located outside of the Project Area include the Wabash River and the North Fork and Middle Fork of the Vermilion River.

National Wetlands Inventory (NWI) data indicate that few, small wetlands are scattered throughout the Project Area, occurring along the waterways. There are approximately 12.87 acres (5.21 ha) of NWI wetlands located within the Project Area, comprising only 0.26% of the wetlands in Vermilion County, and no forested wetlands or wetland habitats are shown within the Project Area in the National Land Cover Database (NLCD).

## 3.6 Land Cover

Land cover in northeastern Vermilion County was historically dominated by prairie ecosystems with small forested areas along the rivers and streams (Illinois Natural History Survey [INHS] 2015). Based on the NLCD, land cover within Vermilion County was dominated by agriculture (80.5%), mostly row crops of corn and soybeans. The Project Area is even more heavily agricultural, with 95% of land cover being cultivated crops (Table 3-1). Developed lands cover nearly all of the remaining land within the parcels. Forested areas are limited to fragmented, linear tracts and small forested bands associated with larger

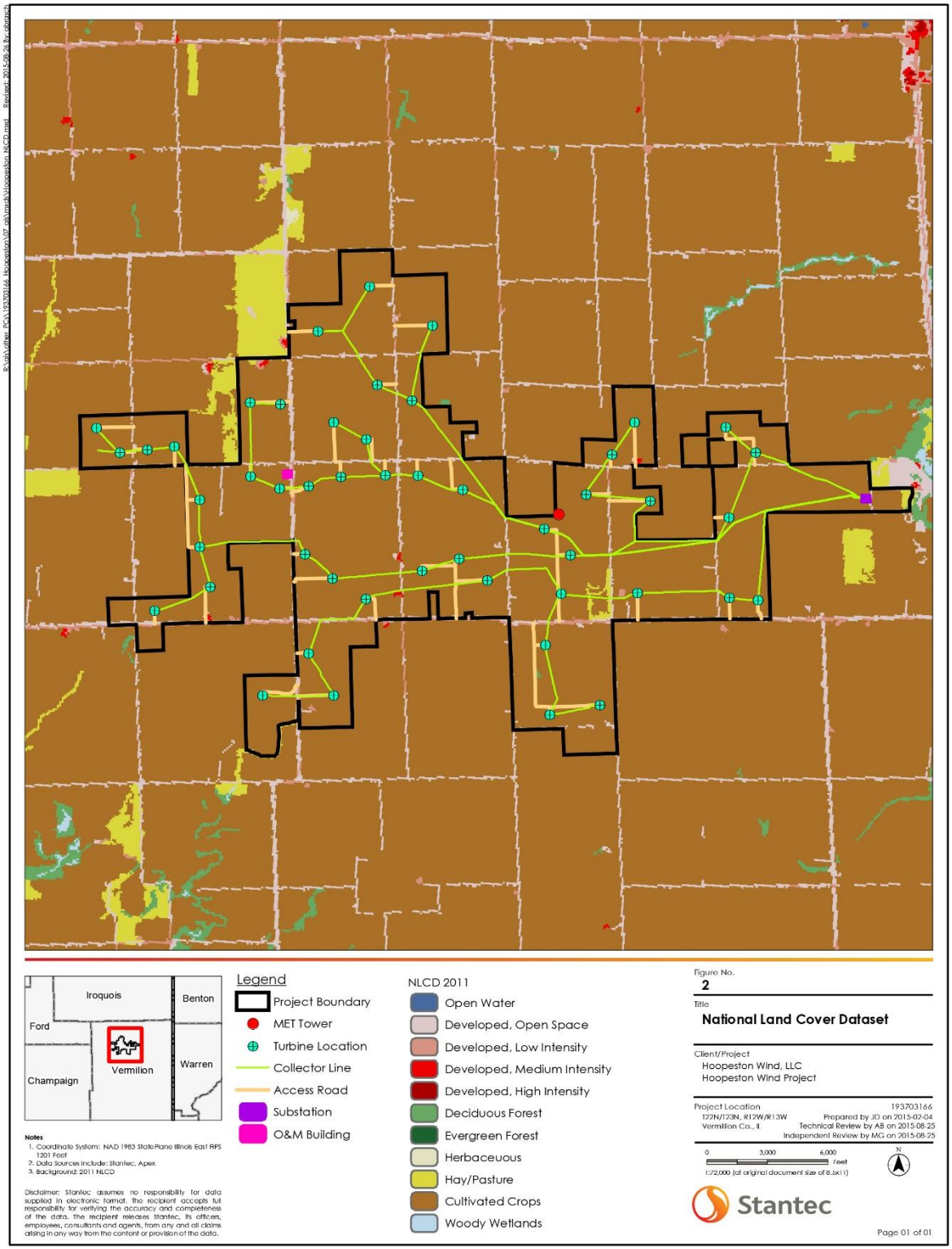
streams (Illinois Geospatial Data 2000). Figure 2 shows the distribution of land cover within the Project boundary.

**Table 3-1. National Land Cover Data within the Hoopeston Wind Project Boundary**

| Land Cover Type | Acres | Approximate Percent Composition (%) |
|---|---|---|
| Developed, Urban Open Space | 345.5 | 4.0 |
| Developed, Low Intensity | 78.1 | 1.0 |
| Developed, Medium Intensity | 9.5 | <0.1 |
| Deciduous Forest | 2.6 | <0.1 |
| Hay/Pasture | 41.8 | <0.1 |
| Cultivated Crops | 8406.4 | 95.0 |
| Total | 8883.9 | 100 |

Source: NLCD 2011

## Figure 2: National Land Cover Data Set



## 3.7 Wildlife in the Project Area

Wildlife in the Project Area is likely typical of the region and adapted to fragmented habitats and human disturbance associated with agricultural activity. Disturbance-tolerant mammalian species such as white-tailed deer (*Odocoileus virginianus*), raccoons (*Procyon lotor*), squirrels (*Sciurus* spp.) and coyotes (*Canis latrans*) are common and widespread in the region. Common species of vultures, hawks, owls, and various songbirds are expected to represent the majority of avian species within the Project Area. Many species of fish, amphibians, and reptiles may occur in the creeks and drainages of the Project Area and surrounding landscapes.

## 3.8 Threatened and Endangered Species

Vermilion County is within the range of four federally listed wildlife species; two bats (Indiana bat and northern long-eared bat) and two mollusks (clubshell [*Pleurobema clava*] and rabbitsfoot [*Quadrula cylindrica cylindrical*]) (USFWS 2015a). Additionally, IDNR and USFWS plan to re-introduce the federally listed extirpated riffleshell (*Epioblasma torulosa*) to the nearby Vermilion River (IDNR 2009a). Of these species, only the two species of bats may potentially be affected by the activities covered under this HCP and are thus treated as Covered Species. Since no potential impacts will occur to the three federally listed mussel species, they are not covered by the ITP and are not further discussed in this HCP. The biology, habitat requirements, and status within the Project Area of the two bat species are discussed in detail in Section 5.0. Expected impacts from the Project's covered activities and the conservation plan for the two bat species are described in Section 6.0.

## 3.9 Other Sensitive Species

### 3.9.1 Non-Listed Bats

A total of 14 species of bat occur in Illinois. Twelve of the 14 species are members of the family Vespertilionidae and have geographic distributions that include Vermilion County: Rafinesque's big-eared bat (*Corynorhinus rafinesquii*), Indiana bat, evening bat (*Nycticeius humeralis*), little brown bat (*Myotis lucifugus*), northern long-eared bat, silver-haired bat (*Lasionycteris noctivagans*), eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), southeastern bat (*Myotis austroriparius*), gray bat (*Myotis grisescens*), tri-colored bat (*Perimyotis subflavus*), and big brown bat (*Eptesicus fuscus*) (Schwartz and Schwartz 1981, Harvey 1992, Bat Conservation International Inc. 2015). Of these, only the Indiana bat and northern long-eared bat are currently federally and state listed as endangered and threatened, respectively. The USFWS is also collecting information for a status review of the little brown bat to determine if threats to the species may be increasing its risk of extinction.

All twelve bat species use woodland habitat for feeding or roosting at some time during the year. In addition, many species of bats feed along stream corridors or over water. A very limited number of shelterbelts of woodland or stream corridors are found within the Project Area (Hale et al. 2014). These areas may, at times, provide potentially suitable foraging and roosting habitat for bats. Bats, particularly big brown bats and evening bats, may occasionally forage over crops within the Project Area, but most species in the region are more likely to use forested and open water habitats (BatCon 2015).

Acoustic surveys confirmed the potential presence of seven bat species within the Project Area: big brown bat, red bat, hoary bat, silver-haired bat, tri-colored bat, evening bat, and northern long-eared bat (Appendix A). Several *Myotis* sp. calls were recorded during the acoustic surveys but, due to the quality of the calls and the overlap in call characteristics between the little brown bat, northern long-eared bat, and Indiana bat, positive identification to species was not possible (Ecosystem Management Inc. 2011, Stantec 2015). Although the Indiana bat and northern long-eared bat are the only species covered under this HCP, it is expected that the avoidance and minimization measures implemented under this HCP will benefit other bat species occurring in the Project Area as well.

### 3.9.2 Bald and Golden Eagles

Bald eagles and golden eagles are protected under the federal BGEPA (16 USC §§668-668d). The bald eagle was officially delisted from by the state of Illinois in 2009 (IDNR 2009b). Bald eagles have been noted by the USFWS (USFWS 2008) to occur in many Illinois counties, and the Project Area is within the historic breeding, wintering, and migration range of the bald eagle. The bald eagle population in Illinois continues to increase, with 100 pairs recorded in 2006 (USFWS 2008). By 2008, the number of counties where nesting occurs had risen to 67 counties (IDNR 2009b). The population trend for wintering bald eagles in Illinois fluctuates, due mainly to weather conditions, but recent counts have indicated a healthy age structure of both adults and immatures (IDNR 2009b). Bald eagles winter primarily along the Mississippi, Rock, and Illinois Rivers in the state, none of which is within or adjacent to the Project Area. The Illinois River is closest to the Project Area but is more than 140 mi (225 km) away at its nearest point. Bald eagles have also been recorded along the Wabash River in Indiana; however, this river is more than 30 mi (48 km) away from the Project Area at its nearest point (INDNR 2013).

Based on the lack of suitable wintering or breeding habitat in the Project Area, and lack of observations during avian studies completed during development of the Project, bald eagles are expected to occur only rarely, if at all, within the Project Area. No known nesting occurrences were listed by IDNR for Vermilion County from 1997 to 2008 (IDNR 2009a), and consultation with IDNR in 2009 indicated that there was an eagle nest recorded about 13 mi (21 km) from the Project Area on the North Fork of the Vermilion River above Lake Vermilion. IDNR indicated that it is likely that new eagle nests will appear along the North Fork and Middle Fork of the Vermilion River during the existence of the Project (IDNR 2009a).

Consultation with the USFWS in 2014 indicated the Project Area is approximately 7.25 mi (11.67 km) from the nearest known bald eagle nest, which is located along the Middle Fork of the Vermilion River. The Project Area does not contain large permanent water sources or forested riparian areas that would be expected to provide bald eagle foraging, nesting, or roosting habitat. Also, no bald eagles were observed in the Project Area during pre-project avian surveys. Hoopeston Wind has committed to implementing a wildlife carrion (i.e., road kill) removal program in the Project Area, as described in the BBCS. This will include coordination with local livestock operators and landowners for the prompt removal or covering of carcasses, as practical. These measures are expected to reduce the likelihood that wintering eagles or other raptors and aerial scavengers will be attracted to the area to forage.

Given this information, the USFWS believes that the risk of eagles colliding with turbines at the Project is low, and as such, does not recommend that Hoopeston Wind apply for an eagle take permit at this time.

Hoopeston Wind will conduct post-construction mortality monitoring to confirm this conclusion. Should post-construction monitoring indicate a change in the expected risk to eagles, Hoopeston Wind will reinitiate coordination with the USFWS. Consequently, bald eagles are not treated as Covered Species in this HCP.

Golden eagles are not currently known to occur in Illinois except as occasional transient visitors. Golden eagles will occupy a wide variety of plant communities within open habitats, but prefer cliffs and large trees with large horizontal branches for roosting, perching, and nesting (Tesky 1994). The species does not nest in Illinois (Kochert et al. 2002), and was not observed during the resident/breeding bird or migratory bird surveys conducted within the Project Area (Ecosystem Management Inc. 2011, Apex 2013). Inquiries to the USFWS and IDNR in 2014 and 2009, respectively, indicated that no golden eagle nest locations are known to occur within 10 mi (16 km) of the Project Area. Golden eagles are, therefore, not expected to occur within the Project Area and are not treated as a Covered Species in this HCP.

## 3.10 Pre-Construction Bat Surveys

### 3.10.1 Bat Habitat Assessment

A habitat assessment for the Indiana bat and northern long-eared bat was conducted at the Project in 2014 (Hale et al. 2014). The majority of the habitat within the Project Area consists of tilled agricultural lands and lacks suitable summer habitat for both the Indiana bat and the northern long-eared bat. However, 73 locations were identified by desktop and field review and evaluated in the field. Each area was classified into four habitat types: non-habitat (no forest), shrubland, immature forest, and mature forest. Dead or dying trees and their characteristics were also recorded during the assessment.

Field study confirmed that the majority of the habitat within the Project Area consists of tilled agriculture lands and lacks suitable summer habitat for both the Indiana bat and northern long-eared bat. A few mature shelterbelts were identified within the Project Area; however, most of the suitable habitat areas lie outside of the Project Area.

Fourteen of the 73 locations were classified as shrubland, 32 were classified as immature forest, and 27 were classified as mature forest. The shrubland areas were considered unsuitable habitat. Fifteen of the classified forest habitats were considered suitable for both Indiana bat and northern long-eared bat, and these consisted of nine shelterbelts, two areas of isolated roost trees, three riparian forested areas, and a six acre (2.4 ha) forest block (Hale et al., 2014). The full assessment report is included in Appendix A.

### 3.10.2 Acoustic Monitoring (2009, 2010, and 2014)

Acoustic surveys were conducted in the Project Area to assess bat activity and to detect the presence of various bat species in spring and fall 2009; spring and fall 2010; and fall 2014. This section provides a summary of the survey results; the full survey reports are included in Appendix A. The 2009 and 2010 surveys utilized both passive (stationary) and active (mobile) echolocation detectors, and the 2014 surveys utilized passive detectors.

### 3.10.2.1 Passive Monitoring 2009 and 2010

Passive acoustic bat surveys were conducted by Ecosystem Management Inc. (2011) at three sampling locations during the spring and fall of 2009 (April 16–May 3 and September 14– September 8) and at six sampling locations during the spring and fall of 2010 (April 12–May 3 and August 31–September 29). Sampling locations were determined based on the presence of bat habitat features, such as woodlots, tree rows, and riparian areas. In 2010, one of the sampling locations was on a Project met tower, located 190 ft (58 m) above ground level (agl).

The majority of calls recorded during these studies could not be identified to the species level, due to the overlap between call characteristics or the quality of the call (e.g., number of pulses, etc). Several *Myotis* sp. calls were recorded, but, due to the overlap in call characteristics between the little brown bat, northern long-eared bat, and Indiana bat and the quality of the calls, positive identification to species was not possible.

For the 2009 surveys, approximately 38.2% of the 518 classifiable calls recorded during the spring and fall were identifiable to species or species group (e.g., *Myotis* sp.). During the spring and fall of 2010 surveys, approximately 15.4% of the 2,693 classifiable calls were identifiable to species or species group. No bats were detected within the Project Area during the late summer survey.

A total of seven species or species groups were identified:

- Big brown bat
- Red bat
- Hoary bat
- Silver-haired bat
- Tri-colored bat (previously eastern pipistrelle)
- Evening bat
- *Myotis* species

### 3.10.2.2 Active Monitoring 2009 and 2010

Ecosystem Management Inc. (2011) conducted active acoustic surveys for four-hour periods during the spring and fall of 2009 and 2010. No bats were detected in either spring survey period. During the fall, bats were detected on all three survey nights in 2009 (September 21, 22, and 28), including 10 big brown bat calls, 3 red bat calls, 1 *Myotis* species call, and 8 calls that could not be identified to species or species group. In 2010, bats were detected on both survey nights (August 31 and September 1), including 17 big brown bat calls and 30 calls that could not be identified to species or species' group.

### 3.10.2.3 Passive Monitoring 2014

Additional acoustic surveys were conducted by Stantec (2015) at two sampling locations during the fall of 2014 (July 31–October 31). Surveys were focused on the fall migratory period. The sampling location in the open agricultural field contained two acoustic detectors (6.6 ft [2 m] agl and 164 ft [50m] agl) mounted

on a Project met tower. The second location was within a narrow band of trees with a detector positioned approximately 6.6 ft (2 m) agl.

Similar to the 2009 and 2010 surveys, a portion of the calls could not be identified to the species level due to the overlap between call characteristics or the quality of the call (e.g., number of pulses, etc). Several *Myotis* sp. calls were recorded during the acoustic surveys but, due to the overlap in call characteristics between the little brown bat, northern long-eared bat, and Indiana bat and the quality of the calls, positive identification of all of the calls to species was not possible.

Approximately 80.9% of the 1,261 classifiable calls were identifiable to species or species group.

A total of nine species or species groups were identified:

- Big brown bat
- Red bat
- Hoary bat
- Silver-haired bat
- Tri-colored bat (previously eastern pipistrelle)
- Evening bat
- Little Brown bat
- Northern long-eared bat
- *Myotis* species

### 3.10.3 Fall Migration Study (2014)

Boyles and McGuire (2014) completed a telemetry-based autumn migration study of Indiana and northern long-eared bats by radio-tagging bats captured approximately 6 mi (9.7 km) west of the Project to determine if they passed through the Project site. A receiving antenna array with a datalogger was installed at the Project to detect movement across the Project Area by radio-tagged bats. Additional receiving arrays with dataloggers were installed at six other locations in the region, which collectively enabled the authors to evaluate movement of radio-tagged bats throughout the region from the point of capture. Twenty-six bats representing five species were captured from August 8 to 24, 2014, at the Middle Fork Forest Preserve, and eight bats (three northern long-eared bats and five Indiana bats) had transmitters attached. No bats with transmitters were detected within the Project Area.

Boyles and McGuire conducted a similar study during fall migration in 2015 in which three Indiana bats and no northern long-eared bats were captured at the North Fork Forest Preserve. The Indiana bats were radio-tagged and none were recorded as crossing the Project site during migration (J. Boyles, pers. comm.).

# 4.0 Description of the Project

## 4.1 Project Purpose and Need

The purposes and need for the Project are:

- To provide an affordable and reliable source of renewable energy to serve the regional electrical grid and energy demand that neither emits pollutants, contributes to climate change and its effects, nor generates the adverse impacts that accompany fossil fuel extraction, processing, waste and by-product disposal, transportation, and combustion.

- To meet the renewable energy goals of the U.S. and Illinois (Illinois enacted legislation, Public Act 95-0481, established that electric utilities in Illinois are required to provide at least 25% of their retail electric supply from renewable energy sources, including wind, by 2025).

- To support and diversify the local and regional economies through job creation and increased tax revenue.

The need for the ITP reflects the uncertainty associated with Indiana and northern long-eared bat migratory activity. Although significant consideration and field study has been completed to confirm that the Project Area is an area with relatively low levels of bat activity, because the location of the Project Area is within the range of both the Indiana and northern long-eared bat, the possibility of their presence – principally as a result of seasonal migration through the Project Area – cannot be completely ruled out. This HCP, therefore, serves the purpose of documenting the steps taken by Hoopeston Wind to avoid and minimize the impact of the Project on Indiana and northern long-eared bats and to provide mitigation for the Project's projected impacts.

## 4.2 Project Description

The Project is a state-of-the-art wind energy facility located in Vermilion County, Illinois, southwest of the city of Hoopeston and west of the village of Rossville. The Project is designed to generate up to 98 MW of electricity and interconnects with a 138-kilovolt (kV) transmission line owned by the Illinois utility subsidiary of Ameren Illinois Corporation. The Project also includes underground power collection lines, a substation, an O&M building, access roads, and a permanent met tower (see Figure 1).

### 4.2.1 Site Selection

The Project site was first identified through a review of available wind resource mapping. As a renewable resource, wind is classified according to wind power classes, which are based on typical wind speeds. These classes range from Class 1 (the lowest) to Class 7 (the highest). Strong wind resources were indicated in the Vermilion County area.

In addition to a strong, reliable wind resource, a wind project requires interconnection to the overall electrical grid via an existing transmission line with sufficient capacity to accommodate the full output of the wind turbines. Hoopeston Wind identified an existing 138 kV high voltage transmission line near the Project Area early on, and this, combined with the robust wind resource, led Hoopeston Wind to continue its development efforts in Vermilion County.

At this site, significant agricultural land use occurs throughout the Project Area, comprising over 95% of the area within the Project Area (see Section 3.6 and Figure 2). Except for the immediate Project footprint, this use would be expected to continue. The character of the overall landscape, therefore, will be minimally changed.

Avoiding negative natural resource and community impacts is a priority for all Apex projects. Of the total approximately 8,884 acres (3,595 ha) within the Project boundary, only a small percentage was affected by project infrastructure. Throughout development of the Project layout, the focus of turbine placement and permanent Project infrastructure was optimized to minimize the Project footprint, resulting in a total permanent impact of approximately 34 acres.

## 4.2.2 Project Characteristics

The Project Area is located southwest of the city of Hoopeston and west of the village of Rossville in Illinois (see Figure 1). Land use throughout much of the Project Area is dominated by agriculture (i.e., row crops and pasture), interspersed with creeks and drainages.

The Project is located on land leased from participating landowners. As a leaseholder, Hoopeston Wind's rights are limited to those incorporated in the lease agreement to allow for safe and effective construction, operation, maintenance and decommissioning of the Project. Hoopeston Wind has no control over landowner activities on the property within which the Project will be located to the extent not covered in specific lease provisions.

Additional detail of various Project components is provided in the following sections.

### 4.2.2.1 Turbines

There are 49 Vestas V100 2.0 MW turbines associated with the Project. Each wind turbine consists of three major components: the tower, the nacelle, and the rotor. The height of the tower, or "hub height" (height from foundation to top of tower) is approximately 312 ft (95 m). The nacelle sits atop the tower, and the rotor hub is mounted to the front of the nacelle. The total turbine height (i.e., height at the highest blade tip position) is approximately 476 ft (145 m). Descriptions of each of the turbine components are provided below.

Tower: The tubular towers used for this Project are conical steel structures manufactured in multiple sections. Each tower has an access door, internal lighting, and an internal ladder to access the nacelle. The towers are painted light gray to make the structure visible to aircraft (viewing against the ground) but decrease visibility against the sky. Steel reinforced concrete foundations were constructed to anchor each tower.

Nacelle: The main mechanical components of the wind turbine are housed in the nacelle. These components include the drive train, gearbox, and generator. The nacelle is housed in a steel reinforced fiberglass shell that protects internal machinery from the environment and dampens noise emissions. The housing is designed to allow for adequate ventilation to cool internal machinery. The nacelle is equipped with an external anemometer and a wind vane that signals wind speed and direction information to an electronic controller. The nacelle is mounted on a bearing that allows it to rotate (yaw) into the wind to maximize energy capture. Attached to the top of each nacelle located on the outside perimeter of the Project Area and some additional locations within the Project Area, per specifications of the Federal Aviation Administration (FAA), is a single, medium intensity aviation warning light. These lights are flashing red strobes (L-864) and operate only at night. Transformers are located in the nacelle.

Rotor: A rotor assembly is mounted to the nacelle to operate upwind of the tower. Each rotor consists of three composite blades with a rotor diameter of 328 ft (100 m). The rotor attaches to the drive train at the front of the nacelle. Hydraulic motors within the rotor hub feather each blade according to wind conditions, which enables the turbine to operate efficiently at varying wind speeds. The rotor can spin at varying speeds to operate more efficiently at lower wind speeds. The wind turbines begin generating energy (i.e., cut in) at wind speeds as low as 6.7 miles per hour (mph; 3.0 meters/second [m/s]) and cut out when wind speeds reach 44.7 mph (20 m/s) for 10 minutes, or with a gust of 60 mph (25 m/s) or higher.

#### 4.2.2.2 Access Roads

The Project includes new or improved roads to provide access to the turbines and substation site, including a ring-road around each turbine. The location of Project access roads is shown in Figures 1 and 2. The roads are gravel-surfaced and approximately 16 ft (4.9 m) in width, though areas up to 90 ft (27.4 m) in width were disturbed during the spreading of topsoil.

#### 4.2.2.3 Collection System and Substation

The Project includes an underground power collection system between the pad mounted transformers and a collector substation. All collector lines are buried a minimum of 4 ft (1.2 m) or 1 ft (0.3 m) below existing drain tile. A substation is located approximately 0.2 mi (0.3 km) southwest of Rossville.

#### 4.2.2.4 Transmission Line

Approximately 270 ft (82.3 m) of overhead 138 kV transmission line extends from the substation to the switchyard. A pad-mounted transformer was installed at the base of each wind turbine and collects electricity generated by each turbine through cables routed down the inside of the tower.

#### 4.2.2.5 Meteorological Towers

One 312 ft (95 m) tall permanent met tower has been installed to collect wind data and support performance testing of the Project (shown on Figures 1 and 2). The tower is a self-supporting, lattice steel structure and is unguyed.

#### 4.2.2.6 Operations and Maintenance Building

An O&M building is located on site approximately 5.6 mi (9 km) west of Rossville on N 750 East Road. This site houses operations personnel, equipment, and materials, and provides staff parking.

## 4.3 Covered Activities

### 4.3.1 Operations and Maintenance

The potential for incidental take of Covered Species exists during the operational life of the Project. Due to the absence of Indiana and northern long-eared bat habitat within the Project Area, and the fact that maintenance activities will be taking place during daylight hours, no measurable take is anticipated to occur as a result of Project maintenance activities.

The potential for take arises from the operation of the turbines at times when Indiana and northern long-eared bats may be present in the Project Area, as the potential exists for individuals to be injured or killed through interactions with rotating turbine blades. The potential impacts of Project operation are fully described and evaluated in Section 6.

To avoid risk to these species during operations prior to issuance of an ITP for the Project, Hoopeston Wind developed and implemented a BBCS, in coordination with USFWS, providing for the curtailment of Project operations during periods of expected risk to Indiana bats and northern long-eared bats. The USFWS issued a Technical Assistance Letter (TAL) to Hoopeston Wind on March 4, 2014, indicating that, if the Project operates in accordance with the terms of the BBCS, it is presumed that take of Indiana bats and northern long-eared bats will be avoided. At the time, the northern long-eared bat had only been proposed for listing, but the TAL and BBCS were designed to address the species in the event that it was listed. Hoopeston Wind is currently operating under the terms of the TAL and the supporting BBCS while review of the HCP is completed and until an ITP is issued. These terms include operating at a cut-in speed of 15.4 mph (6.9 m/s) from August 1 through October 15 between sunset and sunrise based on the rolling wind speed average over a 15-minute period. The effectiveness of these terms will be evaluated via post-construction monitoring in the fall during the first three years of Project operations.

Upon issuance of an ITP, the ITP will authorize the take of Indiana bats and northern long-eared bats resulting from the operation of the Project with avoidance and minimization measures more fully described in Section 7.2, including:

- Operational adjustments that will feather the turbine blades below the cut-in speed of 6.7 mph (3.0 m/s), thereby reducing Indiana and northern long-eared bat mortality; and
- Monitoring the operational Project to allow for appropriate adaptive management.

### 4.3.2 Decommissioning

Commercial wind turbine generators typically have a life expectancy of 20 to 25 years, although their operational life may be extended through maintenance or repair. At the end of their useful life, or if

turbines are non-operational for an extended period of time with no expectation of their returning to operation, the turbines will be decommissioned. Decommissioning consists of removal of Project components/improvements as well as site/land reclamation. Areas disturbed during decommissioning will be re-graded, reseeded, and restored. Because decommissioning activities do not involve the operation of wind turbines, Hoopeston Wind anticipates that these activities will not pose a risk of take to Indiana or northern long-eared bats.

### 4.3.3 Mitigation and Monitoring

This HCP includes mitigation actions (see Section 7.2.2) that will be conducted to offset the impacts of Indiana and northern long-eared bat take that may result from the Project. A range of mitigation actions were considered, including enhancement or protection activities at hibernacula, maternity colony and swarming habitat enhancement or protection, or funding contribution to other important research on threats to these species. The mitigation options selected are described in Section 7.2.2.

Post-construction monitoring will occur during the life of the ITP to ensure compliance with the ITP (see Section 7.3). During monitoring, injured or dead Indiana and/or northern long-eared bats may be collected. Dead Indiana or northern long-eared bats, if any, will be turned over to the USFWS.

## 4.4 Alternatives

Section 10(a)(2)(A) of the ESA and federal regulation 50 CFR 17.22(b)(1) and 17.32(b)(1) require an HCP to provide a description of alternative actions that were considered to reduce impacts to listed species, in this case, the Indiana and northern long-eared bats. Section 5.6 of the Habitat Conservation Planning Handbook (USFWS and National Marine Fisheries Service [NMFS] 2016d) states the HCP should describe “actions the applicant considered as alternatives to take that would result from the proposed action and the reasons why they are not using those alternatives”.Alternatives typically include the following:

- A No-Action Alternative, which means that federal action (i.e., issuance of an ITP by the USFWS), will not occur because Covered Activities will not occur, and no HCP will be needed to minimize and mitigate impacts to the listed species, and

- Any alternative that will reduce incidental take below levels anticipated as a result of Covered Activities.

Each of the alternatives Hoopeston Wind considered is discussed below.

### 4.4.1 Take Avoidance Alternative

Under this alternative, take of Indiana and northern long-eared bats will be completely avoided by:

- Raising nighttime cut-in speeds to 15.4 mph (6.9 m/s) from sunset to sunrise, for the period from August 1 to October 15 each year for the life of the Project. The hub will not be locked, but blades

will be feathered to the wind such that revolutions per minute (rpm) will be minimal during nighttime periods when wind speed is less than 15.4 mph (6.9 m/s).

- Conducting post-construction monitoring for the life of the Project, as described in the BBCS, to confirm avoidance of take.

Because take will be completely avoided, no HCP will be implemented, no mitigation will be implemented, and no ITP will be issued. This alternative was considered but rejected because it did not meet the Project's need (see Section 4.1), and because it was determined to be not practicable or economically sustainable over the projected operating life of the Project.

### 4.4.2 Reduced Cut-In Speed Alternative (Proposed Scenario)

The Reduced Cut-In Speed Alternative is the result of consideration of the range of alternatives to select a Project scenario that meets Project goals while minimizing potential threats to the Indiana and northern long-eared bat.

Under the Reduced Cut-In Speed Alternative:

- Cut-in speed will be 6.7 mph (3.0 m/s) year-round. The hub will not be locked, but blades will be feathered to the wind such that rpm will be minimal during periods when wind speed is less than 6.7 mph (3.0 m/s). The feathering/cut-in process will be computer-controlled and based on 10-minute interval wind speed data. Accordingly, turbines will cut in or feather throughout the night as the wind speed fluctuates above and below 6.7 mph (3.0 m/s).

- Post-construction monitoring will be conducted for the life of the Project, consisting of intensive monitoring in spring (April 1–May 15) and fall (July 15–October 15) migration with weekly monitoring in summer (May 16–July 14) during the first three years of operations under the permit, annual monitoring (April 1–October 15) during the life of the permit, and check-in monitoring (April 1–October 15) in years 15, 16, and 17 of operations (for detailed description of the monitoring plan, see Section 7.3).

- Based on the results of the monitoring, adjustments to cut-in speeds will be addressed in accordance with Section 7.4, Adaptive Management.

- Although risk to both Indiana and northern long-eared bats is considered extremely low, mitigation measures have been incorporated into the Project to provide a long-term benefit to both species that will mitigate for the impacts of permitted take. As more specifically described in Section 7.2.2, initial mitigation will include coordinating with local land preservation entities in the vicinity of the Project to restore and/or preserve and enhance at least 150 acres (60.7 ha) of Indiana and northern long-eared bat summer maternity habitat. The mitigation plan will be implemented in close cooperation with USFWS and IDNR.

### 4.4.3 Increased Cut-In Speed Alternative

Under this alternative, cut-in speeds would be elevated to 11.0 mph (5.0 m/s) during the bat active period (April 1 to October 31). All other elements of the Proposed Scenario would be implemented as described above in Section 4.4.2. Hoopeston Wind rejected this alternative from detailed analysis because under this alternative, Hoopeston would forego the full benefits of Project construction and operation without materially improving species conservation. Hoopeston Wind determined the proposed action includes sufficient measures to minimize and monitor take, making it unnecessary to implement higher cut-in speeds at wind turbines that will result in lower energy production.

# 5.0 Covered Species

## 5.1 Indiana Bat

The Indiana bat was originally listed on March 11, 1967, as being in danger of extinction under the Endangered Species Preservation Act of 1966 (32 FR 4001). The species is currently listed as endangered under the ESA of 1973, as amended.

A USFWS Indiana Bat Recovery Plan was first developed and signed on October 14, 1983 (USFWS 1983). An agency draft of the Revised Recovery Plan was released in March 1999 (USFWS 1999) but was never finalized. The “Indiana Bat (*Myotis sodalis*) Draft Recovery Plan: First Revision” (the “draft Revised Recovery Plan”) was made available for public comment on April 16, 2007 (72 FR 19015-19016) (USFWS 2007). The draft Revised Recovery Plan describes three recovery objectives for reclassification of the species as threatened (USFWS 2007):

1. Permanent protection of 80% of Priority 1 hibernacula.
2. A minimum overall population number equal to the 2005 estimate (457,000).
3. Documentation of a positive population growth rate over five sequential survey periods.

In addition, the draft Revised Recovery Plan describes three recovery objectives for delisting of the species (USFWS 2007):

1. Permanent protection of 50% of Priority 2 hibernacula.
2. A minimum overall population number equal to the 2005 estimate.
3. Continued documentation of a positive population growth rate over an additional five sequential survey periods.

Information regarding the species’ characteristics, habitat requirements, range and status in the vicinity of the Project is provided in the sections below.

### 5.1.1 Species Description

Indiana bats are medium-sized, grayish brown bats with a forearm length of 1.4 to 1.6 inches (3.6 to 4.1 centimeters [cm]) and a total length of 2.8 to 3.8 inches (7.1 to 9.6 cm). The tragus (a fleshy projection arising from the base of the inner ear that directs sound into the ear) is short and blunt and measures slightly less than half the height of the ear. The tail is approximately 80% of the length of the head and body. The skull has a small sagittal crest and a small, narrow braincase. Indiana bats may be distinguished from the similar little brown bat and the northern long-eared bat by the presence of a keeled calcar and toe hairs on the hind feet that are shorter than the claws.

### 5.1.2 Habitat Description

Indiana bats require specific hibernacula conditions (e.g., stable temperature, humidity and air movement), and typically hibernate in large, dense clusters that range from 300 individuals per square foot (Clawson et al. 1980) up to 100,000 individuals per cluster. Studies have found that over 90% of the range-wide population of Indiana bats hibernate in just five states: Indiana, Missouri, Kentucky, Illinois, and New York (USFWS 2007).

The summer habitat requirements of Indiana bats are not fully understood. Until recently, it was believed that floodplain and riparian forests were the preferred habitats for roosting and foraging (Humphrey et al. 1977); however, recent studies have shown that upland forests are also used by Indiana bats for roosting and that suitable foraging habitats may include upland forests, old fields (clearings with early successional vegetation), edges of croplands, wooded fencerows, and pastures with scattered trees and/or farm ponds (USFWS 2007).

The presence of Indiana bats in a particular area during the summer appears to be determined largely by the availability of suitable, natural roost structures. The suitability of a particular tree as a roost site is determined by its condition (live or dead), the amount of exfoliating bark, the tree's exposure to solar radiation, its relative location to other trees, as well as a permanent water source and foraging areas (USFWS 2007).

Thirty-three species of trees have been documented as roosts for female Indiana bats and their young, with 87% of documented roosts located in various ash (*Fraxinus*), elm (*Ulmus*), hickory (*Carya*), maple (*Acer*), poplar (*Populus*), and oak (*Quercus*) species (USFWS 2007). However, the species of the roost tree appears to be a less important factor than the tree's structure (i.e., the availability of exfoliating bark with roost space underneath) and local availability. Studies show that Indiana bats have strong fidelity to summer habitats. Females have been documented returning to the same roosts from one year to the next (Humphrey et al. 1977, Gardner et al. 1991, Callahan et al. 1997) and males have been recaptured when foraging in habitat occupied during previous summers (Gardner et al. 1991).

### 5.1.3 Reproduction and Maternity Roost Habitat Requirements

Indiana bats mate during the fall, just prior to hibernation. Male and female bats congregate near the opening of a cave (usually their hibernaculum), and swarm, a behavior in which large numbers of bats fly

in and out of cave entrances from dusk to dawn, while relatively few roost in the caves during the day (Cope and Humphrey 1977). Swarming lasts over a period of several weeks, with mating occurring during the latter part of that period. Once females have mated, they enter the hibernacula and begin hibernation, whereas males will remain active longer, likely attempting to mate with additional females as they arrive at the hibernacula. Adult females store sperm during the winter with fertilization delayed until soon after they emerge from hibernation.

Females emerge from the hibernacula ahead of the males, usually by mid-to-late April, and migrate by the beginning of May to their summer roost habitats, where they form small maternity colonies (Whitaker and Hamilton 1998). Maternity colonies generally have several separate roost areas located near one another that collectively provide the colony with the necessary roosting resources (including cover and correct temperature provided by exfoliating bark) needed during different environmental conditions. These colonies typically utilize one to a few primary roost trees (Callahan et al. 1997), which provide the proper roosting conditions most of the time, and are normally large, dead trees with exfoliating bark that are exposed to abundant sunlight (Miller et al. 2002, Whitaker and Brack 2002).

The habitat in which the primary roosts have been found varies considerably. Roost trees have been found in dense or open woods, strips of riparian forest, small patches of woods, as well as open land; however, the roosts are normally located in open areas subjected to prolonged sunlight (Whitaker and Brack 2002, Miller et al. 2002). During extreme environmental conditions, such as rain, wind, or temperature extremes, the maternity colony may use alternate roost trees, which likely provide the bats with microclimate conditions that the primary roost trees cannot during times of sub-optimal environmental conditions. The locations of these alternate roosts vary from open areas or in the interior of forest stands. A study of bats in northern Missouri revealed that usage of dead trees in the forest interior increased significantly in response to unusually warm temperatures, and the usage of both interior live and dead trees increased during periods of precipitation (Miller et al. 2002). The primary roosts are typically inhabited by many females and young throughout the summer, whereas alternate roost trees receive only intermittent use by individuals or a small number of bats. Females give birth to a single young in June or early July (USFWS 2007).

### 5.1.4 Foods and Feeding

Indiana bats are a nocturnal insectivore that feeds exclusively on flying insects, with both terrestrial and aquatic insects being consumed. Diet varies seasonally and variation is seen between different ages, sexes, reproductive status groups, and geographic regions (USFWS 2007). A number of studies conducted on the diet of Indiana bats have found the major prey groups to include moths (Lepidoptera), caddisflies (Trichoptera), flies, mosquitoes and midges (Diptera), bees, wasps, and flying ants (Hymenoptera), beetles (Coleoptera), stoneflies (Plecoptera), leafhoppers and treehoppers (Homoptera) and lacewings (Neuroptera) (USFWS 1999), with Coleoptera, Diptera, Lepidoptera and Trichoptera contributing most to the diet (USFWS 2007).

Studies indicate that Indiana bats typically forage from 6 to 100 ft (1.8 to 30 m) above the ground and hunt primarily around, not within, the canopy of trees (USFWS 2007). Foraging areas are most often located in closed to semi-open forested habitats and forest edges, with radio-telemetry data consistently

indicating that wooded areas are preferred as foraging sites, although open habitats such as old fields and agricultural areas may also be used (USFWS 2007). Sparks et al. (2005) found that woodlands were used by foraging Indiana bats nearly twice as often as availability alone would suggest, supporting the idea that Indiana bats preferentially forage in woodlands.

### 5.1.5 Migration

The timing of spring emergence from hibernacula varies across the range of the species, but in general, females emerge first, from mid-to-late April, and males emerge later, from late April to mid-May (USFWS 2007). Females may leave for summer habitat immediately after emerging or shortly thereafter and often travel quickly to where they will spend the summer. Some individuals may travel several hundred miles from their hibernacula, but studies in Indiana and New York found Indiana bats using summer habitat only 30 to 50 mi (48 to 80 km) from their hibernacula (USFWS 2007). Maternity colonies begin breaking up in early August at which time females head back to their hibernacula (USFWS 2007).

### 5.1.6 Rangewide Status

A population decrease of 28% over the Indiana bat's total range was reported from 1960 to 1975 (Thomson 1982). The rangewide population estimate dropped 57% from 1965 to 2001 (USFWS 2007). As of 2006, the USFWS had records of extant winter populations at approximately 281 hibernacula in 19 states and 269 maternity colonies in 16 states (USFWS 2007). The estimated rangewide Indiana bat population in 2015 was at 523,636 bats (USFWS 2015b). The closest known occupied hibernaculum to the Project is Blackball Mine located in LaSalle County, Illinois, approximately 130 mi (209 km) to the northwest of the site (USFWS 2007). As of 2007, this hibernaculum was considered a Priority 2 site, containing a population of 1,804 Indiana bats. There is one closer known hibernaculum, Copperhead Mine, in Vermillion County, Indiana; however, Indiana bats were last documented at this site in 1992 (Whitaker and Rissler 1992).

Current threats to the Indiana bat include modifications to hibernacula that change airflow and alter the microclimate, human disturbance and vandalism during hibernation resulting in direct mortality, natural events during winter affecting large numbers of individuals, disease, and habitat degradation and loss (USFWS 2007).

A relatively recent, and potentially devastating, threat to Indiana bats is a disease known as white-nose syndrome. WNS is a fungal infection that was first identified in eastern New York during the winter of 2006–2007. It was named for the visible presence of a white fungus around the muzzles, ears, and wing membranes of affected bats. A previously unreported species of cold-loving fungus (*Pseudogymnoascus destructans*), which thrives in the darkness, low temperatures (40–50ºF), and high levels of humidity (>90%) characteristic of bat hibernacula, is now known to be the primary pathogen.[2] Bats afflicted with WNS wake more frequently from hibernation, causing them to lose fat reserves that are needed to survive hibernation.[3] It is thought that WNS is transmitted primarily from bat to bat; however, the possibility exists

[2] http://www.fort.usgs.gov/WNS
[3] http://www.fws.gov/northeast/pdf/white-nosefaqs.pdf

that it may also be transmitted by humans inadvertently carrying the fungus from cave to cave on their clothing and gear.

Since first being reported in New York, WNS has been confirmed to be present in 28 states.[4] WNS has been confirmed present in 11 counties in Illinois to date, including LaSalle, Carroll, Adams, Pike, Jackson, Union, Johnson, Pope, Hardin, Saline and Monroe counties. The nearest known hibernaculum, Copperhead Mine, is in a county with confirmed WNS and/or the causative fungus (USFWS 2016a).

Most species of bats that hibernate in the east are now known to be affected, with the little brown bat, northern long-eared bat, and Indiana bat particularly hard hit.[5] The USFWS estimates the Indiana bat population in the USFWS's Appalachian Region, where WNS has more recently spread, dropped 45.8% from 2011 to 2013 based on the 2013 count of Indiana bats (USFWS 2013a) and an additional 70.1% from 2013 to 2015 based on the 2015 count of Indiana bats (USFWS 2015b). Previously, between 2009 and 2011, the Northeast Region dropped 30% based on the 2011 count of Indiana bats (USFWS 2012b), dropped another 39.5% between 2011 and 2013 (USFWS 2013a), and an additional 13.9% between 2013 and 2015 (USFWS 2015b).

### 5.1.7 Ozark-Central Recovery Unit Status

The draft Revised Recovery Plan for the Indiana bat divides the species' range into four recovery units based on several factors such as traditional taxonomic studies, banding returns, and genetic variation (USFWS 2007). The Project Area is located within the Ozark-Central Recovery Unit (OCRU), which includes the range of Indiana bat within the states of Illinois, Missouri, Arkansas, and Oklahoma (USFWS 2007). According to the 2015 Rangewide Population Estimate (USFWS 2015b), the overall Indiana bat population in Illinois was approximately 58,840 in 2013 and 56,055 in 2015 (Table 5-1; USFWS 2015b). This represents approximately 10.7% of the overall 2015 population estimate for Indiana bats and 23% of the Indiana bat population in the OCRU (243,142) (USFWS 2015b). The overall population estimate for the OCRU decreased by approximately 0.3% between 2013 and 2015, and the population estimate for the state of Illinois decreased by approximately 4.7% over the two year period (Table 5-1; USFWS 2015b).

[4] http://www.whitenosesyndrome.org/about/where-is-it-now
[5] http://www.fort.usgs.gov/WNS

**Table 5-1. Indiana Bat Population Estimates for the Ozark-Central Recovery Unit**

| State | 2007 | 2009 | 2011 | 2013 | 2015 |
|---|---|---|---|---|---|
| Illinois | 53,824 | 53,342 | 61,239 | 58,840 | 56,055 |
| Missouri[1] | 183,304 | 181,097 | 182,852 | 184,245 | 185,693 |
| Arkansas | 1,821 | 1,480 | 1,206 | 856 | 1,389 |
| Oklahoma | 0 | 0 | 13 | 5 | 5 |
| **Total** | **238,949** | **235,919** | **245,310** | **243,946** | **243,142** |

[1]A previously unknown Indiana bat hibernaculum was discovered in Missouri in 2012, which contained 123,000 bats when surveyed in January 2013, and over 167,000 when more completely surveyed in 2015. This hibernaculum has been added to each previous survey year due to first-hand accounts of large clusters/numbers of hibernating bats for the past several decades prior to discovery by bat biologists.

Source: USFWS 2015b

### 5.1.8 Illinois Status

The Indiana bat is listed as state endangered in Illinois. State-listed species are protected under the Illinois Endangered Species Protection Act-520 ILCS 10/1, with regulatory authority under state law the responsibility of IDNR. Estimates of the size of hibernating populations of the Indiana bat vary across the state of Illinois. Within the southern portion of the state, estimates ranged from 14,700 in 1965 to 19,491 in 2001, with the most recent estimate (2005) at 42,539 (USFWS 2007). Within the northern portion of the state, estimates ranged from 100 in 1965 to 1,562 in 2001, with the most recent estimate (2005) at 1,804 (USFWS 2007). Recorded maternity colonies are known from 20 counties (USFWS 2007). Known hibernacula in Illinois include:

- 1 – Priority 1 (current and/or observed historic winter populations of ≥10,000 bats and currently have suitable and stable microclimates)
- 6 – Priority 2 (current or observed historic population of 1,000–10,000 bats)
- 7 – Priority 3 (current or observed historic population of 50–1,000 bats)
- 8 – Priority 4 (current or observed historic population of <50 bats)

Of the 22 previously recorded hibernacula, 16 sites have recorded at least one bat since 1995 (USFWS 2007). WNS was confirmed in the Illinois population in 2013 (IDNR 2015). The closest known occupied Illinois hibernaculum to the Project is Blackball Mine located in LaSalle County, Illinois, approximately 130 mi (209 km) to the northwest of the site (USFWS 2007). As of 2007, this hibernaculum was considered a Priority 2 site, containing a population of 1,804 Indiana bats. The other known hibernacula records in Illinois are located in the southern and western tier of counties (USFWS 2007).

The Illinois Natural Heritage Database includes 71 records of extant Indiana bat populations throughout the southern 75% of the state (IDNR 2015). Indiana bat maternity colonies are considered annually present along the upper Middle Fork of the Vermilion River, with captures of post-lactating females from as recent as 2014 (IDNR 2015). The IDNR has issued five previous Incidental Take Authorizations (ITAs) for Indiana bats in Illinois, including three wind farms (IDNR 2015).

### 5.1.9 Status within the Project Area

Maternity colonies are known to occur in Vermilion County, and other summer records are known from adjacent Ford County (USFWS 2007, IDNR 2015). Recent records include a July 2010 survey that identified an Indiana bat maternity colony on the Middle Fork of the Vermilion River in Ford and Champaign counties (IDNR 2010), with records from as recent as 2014 (IDNR 2015). No known hibernacula occur within the Project Area or within Vermilion County (USFWS 2007).

The majority of the Project Area consists of unsuitable tilled agriculture, non-forested shrubland, or areas with no suitable habitat connectivity. Fifteen forested areas within the Project boundary are considered suitable habitat for both the Indiana bat and northern long-eared bat; however, these areas are avoided by turbines by greater than 1,000 ft (305 m). These areas consist of nine shelterbelts, two areas of isolated roost trees, three riparian forested areas, and a 6-acre (2.4 ha) forest block. Additional suitable habitat is also present in areas surrounding the Project Area (Hale et al 2014).

Presence of Indiana bats was not confirmed within the Project Area by acoustic surveys conducted in 2009, 2010, and 2014 (Ecosystem Management Inc. 2011, Stantec 2015). Although several *Myotis* calls were recorded during acoustic surveys, positive identification to species was not possible because of the quality of the calls and the overlap in call characteristics (see Sections 3.9.1 and 3.10.2.3). Furthermore, a telemetry-based datalogger survey conducted in 2014 did not confirm migratory use of the Project by Indiana bats radio-tagged in the nearby Middle Fork Forest Preserve (Boyles and McGuire 2014).

## 5.2 Northern Long-eared Bat

On April 2, 2015, the USFWS published a final rule in the Federal Register (80 FR 17974) designating the northern long-eared bat as a threatened species under the ESA throughout its geographic range. The listing and became effective on May 4, 2015, and the final 4(d) rule became effective on January 14, 2015. The northern long-eared bat is also listed as state threatened in Illinois.

### 5.2.1 Species Description

Northern long-eared bats are medium-sized yellowish brown bats with a forearm length of 1.3 to 1.5 inches (3.2 to 3.9 cm) and a total length of 3.0 to 3.4 inches (7.6 to 8.7 cm). The tragus is long, pointed, and measures more than one-half the height of the ear and is not obviously curved. Northern long-eared bats may be distinguished from the similar little brown bat and Indiana bat by longer ears and a longer, pointed tragus. The calcar is usually slightly keeled, and the toe hairs are medium-long and sparse.

### 5.2.2 Habitat Description

Suitable summer habitat for northern long-eared bats is quite variable. They will utilize a wide variety of forested habitats for roosting, foraging, and traveling and may also utilize some adjacent and interspersed non-forested habitat such as emergent wetlands and edges of fields. Males and non-reproductive females may utilize cooler roost spots such as caves or mines.

Winter habitat includes underground caves and cave-like structures such as mines and railroad tunnels. These hibernacula typically have high humidity, minimal air current, large passages with cracks and crevices for roosting, and maintain a relatively cool temperature (0–9 degrees Celsius) (USFWS 2014). The hibernation season in Illinois is November 1 through March 31 (USFWS 2014). Currently, 21 hibernacula sites with one or more winter records are known in Illinois, mostly in the southern portion of the state (USFWS 2015a).

### 5.2.3 Reproduction and Maternity Roost Habitat Requirements

Roosting habitat includes forested areas with live trees and/or snags with a diameter at breast height (DBH) of at least 3 inches (7.6 cm) with exfoliating bark, cracks, crevices, and/or other cavities. Trees are considered suitable if they meet those requirements and are located within 1,000 ft (305 m) of the nearest suitable roost tree, woodlot, or wooded fencerow (USFWS 2014). Maternity habitat is defined as suitable summer habitat that is used by juveniles and reproductive females. The summer maternity season in Illinois is April 1 through September 30 (USFWS 2014).

### 5.2.4 Foods and Feeding

Northern long-eared bats begin foraging at dusk, focusing on upland and lowland woodlots and tree-lined corridors, catching insects in flight. They will also feed by gleaning insects from vegetation and water surfaces (USFWS 2014). Prey includes moths, flies, leafhoppers, caddisflies, and beetles.

### 5.2.5 Migration

Northern long-eared bats migrate between their winter hibernacula and summer habitat, typically between mid-March and mid-May in the spring, and mid-August and mid-October in the fall. They are considered a short-distance migrant, with migration distances documented between 35 mi (56 km) and 55 mi (89 km; USFWS 2015a), and the IDNR considers them a short-distance migrant limited to approximately 60 mi (97 km; IDNR 2015).

### 5.2.6 Range-wide Status

The northern long-eared bat is a commonly encountered species throughout the majority of the Midwest, often commonly captured in mist-net surveys (USFWS 2013b). However, their distribution among hibernacula in the Midwest is not very well known. The northern long-eared bat is less common in the southern and western portions of its range than in the north, though they are considered abundant in the Black Hills National Forest of South Dakota. In Canada, the species occurs throughout a majority of the

forested regions, though, similar to the United States, it is more commonly encountered in the eastern portions of its range (USFWS 2013b).

Disease is the principal factor currently affecting the population status of northern long-eared bats throughout their range in the U.S. and Canada (Frick et al. 2010, USFWS 2013b). Currently, the transmission of WNS has affected approximately 40% of the bat's range. Within four years of initial WNS detection, northern long-eared bats have been documented to experience up to 100% decline at some hibernacula (Turner et al. 2011). Other factors such as habitat loss and modification, wind farm and urban development, and disturbance at hibernacula likely also impact this species, but no other single factor has had the profoundly devastating impact to northern long-eared bat populations as WNS. The USFWS (2013a) estimates that WNS will eventually spread throughout the entire known North American population of northern long-eared bats, and they estimate that impacts from WNS could lead to extinction of this species by 2026.

### 5.2.7 Illinois Status

The northern long-eared bat is currently listed as threatened within the state of Illinois. Northern long-eared bats are commonly captured in the Shawnee National Forest in southern Illinois (approximately 185 mi [298 km] south of the Project) and have been captured fairly consistently during surveys between 1999 and 2011 at Oakwood Bottoms in the Shawnee National Forest (USFWS 2013b). There are 21 known hibernacula (sites with one or more winter records) in the state (USFWS 2015a).

The Illinois Natural Heritage Databased includes 87 records for extant populations of northern long-eared bats, scattered throughout the state (IDNR 2015). The IDNR has issued only one previous ITA for northern long-eared bats due to their recent listing, and it was for a nearby wind farm (IDNR 2015).

### 5.2.8 Status within the Project Area

The Project Area falls within the known range of the northern long-eared bat, and the IDNR has records of annual maternity colonies of northern long-eared bats along the Middle Fork of the Vermilion River and its tributaries in Ford and Champaign counties, based on captures of post-lactating females as recently as 2014 (IDNR 2015). No known hibernacula occur within the Project Area.

The majority of the Project Area consists of unsuitable tilled agriculture, non-forested shrubland, or areas with no suitable habitat connectivity. Fifteen forested areas within the Project boundary are considered suitable habitat for both the Indiana bat and northern long-eared bat; however, these areas are avoided by turbines by greater than 1,000 ft (305 m). These areas consist of nine shelterbelts, two areas of isolated roost trees, three riparian forested areas, and a 6-acre (2.4 ha) forest block. Additional suitable habitat is also present in areas surrounding the Project Area (Hale et al. 2014).

Acoustic surveys conducted in 2009 and 2010 did not confirm the presence of the northern long-eared bat within the Project Area (Ecosystem Management Inc. 2011); although several *Myotis* calls were recorded during acoustic surveys, identification to species was not possible because of the quality of the calls and the overlap in call characteristics (see Sections 3.9.1 and 3.10.2.3). However, an additional

survey in fall 2014 (July 31 through October 31) did confirm the presence of northern long-eared bats with in the Project Area on October 20, 2014 (Stantec 2015). No radio-tagged northern long-eared bats were documented during migration via a telemetry-based survey conducted in 2014 of radio-tagged bats in the nearby Middle Fork Forest Preserve (Boyles and McGuire 2014), which is approximately 6 mi (9.7 km) from the Project.

# 6.0 Effects of the Proposed Action

## 6.1 Direct Effects

### 6.1.1 Habitat Loss

No loss of summer maternity habitat will occur as a result of Project operation. Due to the limited amount of suitable habitat within the Project Area, the placement of turbines over 1,000 ft (304.8 m) away from suitable summer habitat per the TAL requirements, and the availability of suitable habitat outside of the Project Area, take of the Indiana bat or northern long-eared bat as a result of operation of the Project during the summer maternity season is not expected. The USFWS considers 1,000 ft to be the distance that northern long-eared bats and Indiana bats will travel from suitable habitat, and both species are unlikely to occur in areas located more than 1,000 ft from suitable habitat (USFWS 2014).

### 6.1.2 Mortality

Bat mortality has been documented at wind energy facilities worldwide (Arnett et al. 2008). The primary bat species affected by wind facilities are migratory, foliage- and tree-roosting lasiurine species that undergo long-distance migrations and do not hibernate. Arnett et al. (2008) compiled data from 21 studies at 19 wind facilities in the U.S. and Canada and found that mortality has been reported for 11 of the 45 bat species known to occur north of Mexico. Of the 11 species, the hoary bat, eastern red bat, and silver-haired bat have the highest mortality rates, with the hoary bat comprising 61.7% of all fatalities (Arnett et al. 2008).

Prior to September 2009, no mortality of species listed as threatened or endangered under the ESA had been reported in connection with wind energy facilities, including the Indiana bat (Arnett et al. 2008). In September 2009, the first documented take of an endangered Indiana bat occurred at BP Wind Energy's Fowler Ridge Wind Farm (FRWF) located in Benton County, Indiana (FRWF 2013); FRWF is approximately 12 mi (19.3 km) from the Project. Including this, a total of seven Indiana bats have been documented at five separate wind farms in the northeastern and Midwestern U.S. A summary of these publicly available fatalities is provided in Table 6-1.

Approximately 40 northern long-eared bat fatalities have been recorded from wind energy facilities located in North America (Table 6-1), representing less than 1 % of the total bat mortality (USFWS 2016b). The northern long-eared bat was not listed or proposed for listing when many of these fatalities occurred; however, these records do provide information on the rarity of northern long-eared bat fatalities,

given the large number of wind energy facilities operating within the species' range. A summary of publicly available northern long-eared bat fatalities is provided in Table 6-1 below.

**Table 6-1. Summary of publicly available Indiana and northern long-eared bat fatalities at wind energy facilities in the U.S. and Canada by season**.

(Spring = prior to June 1, Summer = June 1 to July 31, Fall = August 1 or after).

| Species | Wind Farm | State/ Providence | Number Taken | Year(s) | Season | Source |
|---|---|---|---|---|---|---|
| Indiana Bat | Blue Creek | Ohio | 1 | 2012 | Fall | USFWS 2012c |
| | Fowler Ridge | Indiana | 2 | 2009, 2010 | Fall | FRWF 2013 |
| | Laurel Mountain | West Virginia | 1 | 2012 | Summer | USFWS 2012d |
| | North Allegheny | Pennsylvania | 1 | 2011 | Fall | USFWS 2011a |
| | Undisclosed Location | Ohio | 2 | 2013, 2014 | Spring, Fall | USFWS, pers. comm. |
| Northern Long-eared Bat | Anonymous (Site 2-14) | Pennsylvania | 1 | 2009 | Fall | Taucher et al. 2012 |
| | California Ridge | Illinois | 2 | 2013, 2014 | Fall | IDNR 2015, K.Shank pers. comm. |
| | Pittsfield, Pike County | Illinois | 1 | 2014 | Spring | IDNR 2015 |
| | Cohocton and Dutch Hill | New York | 1 | 2010 | Summer | Stantec 2011 |
| | Criterion | Maryland | 1 | 2011 | Summer | Young et al. 2013 |
| | Erie Shores | Ontario | 6 | 2007 | Spring, Summer, Fall | James 2008 |
| | Fowler Ridge | Indiana | 2 | 2009, 2010 | Fall | FRWF 2013 |
| | Kingsbridge I | Ontario | 1 | 2006 | Fall | Stantec 2007 |
| | Meyersdale | Pennsylvania | 2 | 2004 | Fall | Kerns et al. 2005 |
| | Mountaineer | West Virginia | 6 | 2003 | Fall | Kerns and Kerlinger 2004 |
| | Mount Storm | West Virginia | 1 | 2008 | Fall | Young et al. 2009 |
| | Noble Ellenburg | New York | 1 | 2008 | Fall | Jain et al. 2009 |
| | Noble Wethersfield | New York | 6 | 2010, 2011 | Summer, Fall | Jain et al. 2011, Kerlinger |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | et al. 2011 |
| | PGC unknown site[1] | Pennsylvania | 1 | Unknown | Summer | J. Taucher, PGC, pers. comm. with AWEA 2015 |
| | PGC unknown site[1] | Pennsylvania | 1 | 2012 | Summer | J.Taucher, PGC, pers. comm. with AWEA 2015 |
| | Ripley | Ontario | 2 | 2008 | Fall | Jacques Whitford 2009 |
| | Steel Winds[2] | New York | 6 | 2007 | Unknown | Grehan 2008 |

[1] These sites were participating in the Pennsylvania Game Commission Wind Energy Voluntary Cooperation Agreement and were not identified by name.

[2] New York State Department of Environmental Conservation identified the bat species for this survey and provided the information to WEST; the species were not included in the original report.

Within the state of Illinois, no Indiana bats and only three northern long-eared bats have been found as fatalities at wind facilities (Table 6-1), representing 0.013% of estimated total bat mortality in the state as of 2014 (IDNR 2015). The three northern long-eared bat fatalities in Illinois occurred at two different projects, California Ridge in Vermilion and Champaign counties, and another project near Pittsfield in Pike County (K. Shank, pers. comm.). The project in Pike County has several known roosts of both Indiana and northern long-eared bats in the vicinity, but none closer than 2,000 ft (610 m) from the single turbine in the vicinity (K.Shank, pers. comm.). The northern long-eared bat fatality at that turbine occurred on May 28, 2014, at the 1.65 MW turbine built in 2005 (K. Shank, pers. comm.).

The two northern long-eared bat fatalities at California Ridge, located in the same county as Hoopeston, occurred in September of 2013 and 2014 (K. Shank, pers. comm.). Both fatalities occurred at 80 m turbines (1.6 MW) that are part of an acoustic deterrent study (under USFWS permit TE03502B-0), with one fatality occurring at a “control” turbine and one at a “treatment” turbine, though neither turbine was curtailed (K. Shank, pers. comm.).

Due to the absence of significant Indiana and northern long-eared bat records, it is instructive to consider general information regarding bat mortality to understand what type of mortality has been recorded and for what species. Bat mortality at wind facilities has been reported from direct impact with a spinning turbine blade or from barotrauma. Barotrauma involves tissue damage to air-containing structures (e.g., lungs) caused by rapid or excessive pressure change (Baerwald et al. 2008). As turbine blades spin, the blades create areas of low pressure. Bats flying through these areas may suffer barotrauma in as high as 90% of cases (Baerwald et al. 2008); however, more recent studies have concluded that traumatic injury is still the leading cause of death (Rollins et al. 2012, Grodsky et al. 2011).

The results of the acoustic bat survey conducted in 2009, 2010, and 2014 at the Project (Appendix A) had a limited number of potential *Myotis* calls, suggesting low levels of *Myotis* activity within the Project Area

(see Section 3.10.2). A small number of *Myotis*, including Indiana and northern long-eared bats, may occur in the Project Area during the fall.

## 6.2 Indirect Effects

Indirect effects are those effects that are caused by or will result from the proposed action and are later in time but are still reasonably certain to occur. For the purposes of an HCP, the indirect effects in question must be reasonably foreseeable, a proximate consequence of the covered activities proposed under the HCP, and must rise to the level of take (USFWS and NOAA 1996) if they are to be included as a covered activity. None of the indirect effects associated with the operation or maintenance of the Project are likely to result in take of either Indiana or northern long-eared bats as explained below.

During maintenance, some limited tree clearing or trimming may need to occur. In the unlikely event that trees >3 inches (7.7 cm) DBH would require removal, such trees will be cleared from November 1 to March 31 or inspected by a qualified biologist to confirm no roosting bats are present prior to removal.

The Project is intended to supply electricity to the regional electrical grid to address existing and projected future energy needs. As such, significant local community growth is not anticipated as a consequence of the Project's energy contribution. The operation of the Project is not expected to result in significant local community growth. The Project will be staffed by approximately 10 personnel throughout the life of the Project. Agricultural, recreational, and other customary activities on the lands surrounding the turbines likely will continue to take place as they did prior to the construction of the wind farm.

A potentially positive indirect effect on Indiana and northern long-eared bats is the addition of the Project as a renewable energy source, offsetting the potential operation of fossil fuel–fired generating sources and with the potential to slow the effects of climate change on species including Indiana and northern long-eared bats. However, the specific level of such benefit attributable to the Project facility is not readily quantifiable.

The mitigation associated with the Project (increased restoration and protection of summer habitat) is not anticipated to result in an indirect negative effect to either species, but should directly enhance species viability.

## 6.3 Effects on Critical Habitat

A final rule designating critical habitat for the Indiana bat was published on September 24, 1976 (41 FR 41914). The critical habitat consists of 11 caves and two mines in six states:

- Illinois – Blackball Mine (LaSalle County)
- Indiana – Big Wyandotte Cave (Crawford County) and Ray's Cave (Greene County)
- Kentucky – Bat Cave (Carter County) and Coach Cave (Edmonson County)
- Missouri – Cave 021 (Crawford County), Capes 009 and 017 (Franklin County), Pilot Knob Mine (Iron County), Bat Cave (Shannon County) and Cave 029 (Washington County)
- Tennessee – White Oak Blowhole Cave (Blount County)

- West Virginia – Hellhole Cave (Pendleton County)

No critical habitat has been designated for the northern long-eared bat to date.

The Project Area does not occur within or in close proximity to, nor will it directly affect, designated Indiana bat critical habitat; therefore, none will be affected.

## 6.4 Incidental Take Permit

The USFWS will issue an ITP upon a finding that this HCP meets the permit issuance criteria set forth in 50 CFR § 17.32(b)(2), including that the actions proposed by Hoopeston Wind will not appreciably reduce the likelihood of the survival and recovery of the Indiana bat or northern long-eared bat in the wild, and that Hoopeston Wind has minimized and mitigated the effects of its activities to the maximum extent practicable. The minimization and mitigation measures that Hoopeston Wind will implement to meet this standard are described in the Conservation Plan in Section 7.0 of this HCP.

### 6.4.1 Scope of the Incidental Take Permit

#### 6.4.1.1 Permit Period and Area

Hoopeston Wind is seeking a 30-year ITP for the Indiana and northern long-eared bat within the Project Area. This HCP identified the measures intended to assure that the effects of incidental take will be minimized and mitigated to the maximum extent practicable.

#### 6.4.1.2 Type of Take

The Project has the potential to result in take of both the Indiana and northern long-eared bat during operation of the Project through mortality due to collision with turbine blades or as a result of barotrauma; however, take or temporary harm or harassment of individuals in the course of project maintenance and decommissioning, or the implementation of mitigation activities is not expected. Accordingly, the ITP will cover potential incidental take occurring in connection with otherwise lawful activities related to the operation of the Project and the implementation of mitigation activities pursuant to this HCP.

### 6.4.2 Take Estimate

#### 6.4.2.1 Take Estimation Methodologies

In order to evaluate risk and predict levels of take of federally listed bats at the Project, Hoopeston Wind considered three take estimation methods that rely on regional, national and site-specific data. Hoopeston Wind used each of these methods to develop take estimates for the Project prior to implementing minimization measures (i.e., feathering below the 6.7 mph [3.0 m/s] cut-in speed during the active season). Each method is described in detail in the Sections below.

#### 6.4.2.1.1 Fowler-based Approach

The Fowler-based Approach uses data from an operating wind farm located nearby in Indiana (approximately 12 mi [19.3 km] away) with known Indiana bat and northern long-eared bat take, and similar habitat to the Project Area (see Section 3.10.1). Based on data collected at the Fowler Wind Farm (FRWF) during 2010 and 2011 at turbines where no minimization measures were implemented, fall bat fatality at the facility was estimated to average 17.85 (90% CI = 14.56–21.97) bats/MW/fall season. Of the 1,246 total bat carcasses found during the three (2009–2011) fall search seasons at FRWF, two carcasses were Indiana bats and one carcass was a northern long-eared bat. The percent composition of Indiana bat fatality was therefore calculated to be 0.16% of the total bat fatality, and northern long-eared bats comprised 0.08% of all bat fatalities. Applying the FRWF average fatality estimate to the Project (17.85 bats/MW/season x 98 MW) produces an estimated bat fatality of 1,749 bats/fall season (90% CI = 1,423–2,153). Using the Fowler-based Approach, assuming that 0.16% of all bat fatalities are Indiana bats and 0.08% are northern long-eared bats, approximately 2.8 (90% CI = 2.3–3.4) Indiana bats and 1.4 (90% CI = 1.1–1.7) northern long-eared bats are estimated to be taken at the Project each year under no operational adjustments.

#### 6.4.2.1.2 Arnett-Baerwald Approach

The Arnett-Baerwald Approach uses rates of Indiana and northern long-eared bat take from wind projects across the nation, including projects with no take of either species. Based on Arnett and Baerwald (2013), there were 13,361 installed MW of wind energy in the Midwestern Deciduous Forest-Agricultural Region (Southern Ontario, Minnesota, Wisconsin, Iowa, Michigan, Illinois, Missouri, Indiana and Ohio) as of September 30, 2011. This area had 23 studies at 14 sites with data on bat fatalities, resulting in a mean number of fatalities of 7.94 (95% CI = 4.92–10.96) bats/MW/yr. Across all regions, northern long-eared bats and Indiana bats comprised less than 0.01% of all fatalities, though this number was revised to 0.05% for northern long-eared bats by Western EcoSystem Technologies, Inc. in a presentation at the National Wind Coordinating Collaborative meeting in December 2014. Applying the average fatality estimate to the Project (7.94 bats/MW x 98 MW) produces an estimated bat fatality of 778 (95% CI = 482–1,074) bats. Considering that Indiana bats comprise <0.01% of all fatalities and northern long-eared bats comprise 0.5%, approximately 0.08 (95% CI = 0.05–0.1) Indiana bats and 3.9 (95% CI = 2.4–5.4) northern long-eared bats are estimated to be taken each year at the Project without any operational adjustments.

#### 6.4.2.1.3 Acoustics Approach

The Acoustics Approach uses site-specific data from the pre-construction acoustic surveys described in Section 3.10. All data from the fall migratory season (July 31–October 31) were run through Kaleidoscope (Wildlife Acoustics, Maynard, MA) to identify calls to the species level, and then any *Myotis* call was qualitatively reviewed. Of the 2,365 calls identified by Kaleidoscope as *Myotis* (n = 100), 24 were determined potentially *Myotis* via qualitative analysis:

- 1 potential northern long-eared bat
- 1 potential Indiana bat
- 7 potential little brown bats
- 12 potential *Myotis* calls

- 3 potential *Myotis*, but not northern long-eared bats

Of the 24 *Myotis* calls detected, there are up to 13 potential northern long-eared bat calls (1 potential northern long-eared bat + 12 potential *Myotis*) and 16 potential Indiana bat calls (1 potential Indiana bat + 12 potential *Myotis* + 3 potential *Myotis*, but not northern long-eared bat). The 13 potential northern long-eared bat calls account for 0.6% of all calls identified to the species level recorded on-site during fall. The 16 potential Indiana bat calls account for 0.7% of all calls recorded on-site during fall. Given the average fatality estimate for the region from the Arnett-Baerwald Approach (7.94 bats/MW x 98 MW) produces an estimated bat fatality of 778 (95% CI = 482–1,074) bats. Considering that Indiana bats comprised up to 0.7% of fall bat activity at the site and northern long-eared bats comprised up to 0.6%, approximately 5.5 (95% CI = 3.4–7.5) Indiana bats and 4.7 (95% CI = 2.9–6.4) northern long-eared bats are estimated to be taken each year at the Project. It is likely that these estimates are high, given that bat data were collected at several “wooded sites” representing good bat habitat as opposed to areas representative of turbine locations, as well as at heights below the rotor-swept zone for 10 of the 12 recording locations. In addition, the potential *Myotis* calls were used to calculate both the Indiana and northern long-eared bat ratios, whereas each call can actually represent only one species.

#### 6.4.2.2 Average Take Estimate

To estimate the amount of northern long-eared and Indiana bat take that would occur at the Project prior to implementing minimization measures (i.e., feathering below the 6.7 mph [3.0 m/s] cut-in speed), Hoopeston Wind averaged the take estimates resulting from the three approaches discussed above (Table 6-2). Because data from ground units was collected in nonrepresentative habitats, Hoopeston Wind also averaged only the Fowler and Arnett-Baerwald approaches to compare and consider the validity of the three-method average for predicting take at the Project. Table 6-2 presents the take estimates for the Project that result from each method.

**Table 6-2. Indiana bat and northern long-eared bat take estimates at the Hoopeston Wind project, using three estimators.**

| Method | Total bats (per year) | Indiana bats (per year) | Northern long-eared bats (per year) |
|---|---|---|---|
| **Fowler-based Approach** | **1,768** (90% CI: 1,442–2,175) | **2.8** (2.3–3.5) | **1.4** (1.2–1.7) |
| **Arnett-Baerwald Approach** | **786** (95% CI: 487–1,085) | **0.08** (0.05–0.1) | **3.9** (2.4–5.4) |
| **Average of above 2 approaches** | | **1.4** | **2.7** |
| **Acoustics approach** | **786** (95% CI: 487–1,085) | **5.5** (3.4–7.6) | **4.7** (2.9–6.5) |
| **Average of all 3 approaches** | N/A | **2.8** | **3.3** |
| **Proposed Estimate** | **N/A** | **2.0** | **3.0** |

In summary, the average using only the Fowler and Arnett-Baerwald approaches is 1.4 Indiana bats and 2.7 northern long-eared bats per year, whereas the average of the three methods results in an overall take estimate of 2.8 Indiana bats and 3.3 northern long-eared bats per year at the Project. Due to the fact that all three estimates are coarse scale estimates, and the numbers are describing fractions of bats at very low numbers, Hoopeston Wind proposes to use intermediate values of estimated take of 2 Indiana bats and 3 northern long-eared bats per year.

### 6.4.2.3 Take Estimate Adjusted for Minimization Measures

Based on coordination with USFWS, Hoopeston Wind determined the expected risk period for potential take to be during the fall migration season. However, as an additional risk reduction measure, Hoopeston Wind proposes to operate the Project by feathering below the manufacturer's cut-in speed (6.7 mph [3.0 m/s]) during the spring (April 1–May 15), summer (May 16–July 31) and fall (August 1–October 15) periods. Research suggests that feathering below the manufacturer's cut-in speed can reduce fatalities by 35% to 57.5% (Baerwald et al. 2009, Young et al. 2011, Good et al. 2012). Using the conservative estimate of a 35% reduction in fatalities, the take estimates of 2 Indiana bats and 3 northern long-eared bats/year without minimization will be reduced to 1.3 Indiana bats and 1.9 northern long-eared bats/year if manufacturer's cut-in speed curtailment was implemented.

For the purpose of an ITP, Hoopeston Wind proposes to apply for a take limit of 2 Indiana bats and 2 northern long-eared bats per year, despite the conservative measure of feathering below manufacturer's cut-in speed to reduce risk. This will result in a total of 60 Indiana bats and 60 northern long-eared bats over the 30-year term of the ITP.

### 6.4.2.4 Proposed Take Limit

No Indiana or northern long-eared bat mortality is expected to occur during maintenance, decommissioning, or mitigation activities. The only Project activity that may potentially result in the take of

Indiana or northern long-eared bats is project operation. Hoopeston Wind proposes to apply for a take limit of 60 Indiana bats and 60 northern long-eared bats based on the cumulative estimated average over the 30-year ITP term (2 bats per year for both Covered Species, over the 30-year term of the permit).

Due to annual variation in environmental factors that may affect Indiana and northern long-eared bat population sizes and migration, annual take can be expected to vary from year to year. In an effort to be responsive to this variation, and to ensure that the 30-year take limits are not exceeded, this HCP includes post-construction monitoring and annual adaptive management take thresholds, which are described in detail in Sections 7.3 and 7.4. This expanded timeframe for measuring take compliance will allow for changes to be made to the operating plan to ensure authorized take is not exceeded. Cumulative records of calculated annual take will be kept throughout the 30-year life of the ITP.

### 6.4.3 Impacts of Estimated Take

The relatively low level of *Myotis* activity recorded within the Project Area during the fall migration period, and the limited number of potential Indiana and northern long-eared bat calls identified, support the conclusion that while both species may pass through the Project, concentrated migration of either species is not likely to occur. Given that migratory routes for Indiana bats and northern long-eared bats in the Midwest remain generally unknown, it cannot be predicted with certainty from which maternity colonies or hibernacula bats migrating through the Project Area may originate. Due to the location of the Project Area away from summer bat habitat or known hibernacula, take at the Project will likely originate from more than one maternity colony and more than one hibernacula. Based on the maximum known migration distance for Indiana bats (357 mi [574 km]) (USFWS 2011b) and the location of known hibernacula relative to the Project Area, it is expected that all or most of the Indiana bats taken by the Project will belong to the OCRU population. The size, status, and distribution of northern long-eared bat populations are not known; however, given the short maximum migration distance for the species (55 mi [89 km]; USFWS 2015a), it is expected that most of the northern long-eared bats taken by the Project will belong to the local population.

Therefore, take from the Project is not expected to significantly affect any single Indiana bat or northern long-eared bat maternity colony or hibernaculum and take is not expected to result in permanent loss of the reproductive potential of a maternity colony, or of the maternity colony itself. Additionally, loss of the anticipated small number of bats is unlikely to adversely impact any hibernating populations to which these individuals belong, since take is expected to be spread across multiple hibernacula.

Indiana and northern long-eared bats taken by the Project may include non-reproductive juveniles as well as adult female and male bats. Mortality statistics are skewed toward males of the four most commonly killed species at wind energy facilities: the hoary bat, eastern red bat, silver-haired bat, and tri-colored bat (Arnett et al. 2008). Behavioral-based risk factors have been hypothesized to increase the exposure potential for male tree bats at turbines (Cryan 2008). However, there are no data that suggest that male *Myotis* bats may be more vulnerable to wind turbine mortality (USFWS 2011b). Gruver et al. (2009) recorded an equal number of male and female *Myotis* fatalities at a wind energy facility in Wisconsin and BHE Environmental (2011) recorded more female *Myotis* fatalities than male *Myotis* fatalities at another wind energy facility in Wisconsin. Because the Project is expected to take migrating individuals originating

from a variety of unknown locations, it is currently most reasonable to assume equal risk for male and female bats within the Project Area.

#### 6.4.3.1 Resource Equivalency Analysis (REA) of Proposed Take

To analyze the potential impacts of take, Hoopeston Wind ran the REA-based model developed by the USFWS for both Indiana bats and northern long-eared bats based on the proposed level of take (USFWS 2013c). The REA model uses the resource service of reproduction as the unit of measurement and evaluates the reproductive potential of females from the population. This is based on the assumption that when an adult female bat is prematurely taken at a wind energy facility, her and her offspring's reproductive potential is lost. This analysis for the Covered Species is presented below.

##### 6.4.3.1.1 Indiana Bat

Although the overall ratio of females to males in the Indiana bat population within the OCRU is assumed to be 1:1, female Indiana bats are expected to occur more frequently than males in the population as distance from hibernacula increases. Female Indiana bats disperse from hibernacula to join summer maternity colonies, while male Indiana bats typically remain closer to hibernacula throughout the summer. Therefore, more female Indiana bats than male Indiana bats are expected to migrate through the Project Area, based on the distance of the Project Area to hibernacula. The USFWS estimates a 3:1 ratio of female to male Indiana bats migrating through the Project Area each fall (USFWS 2012e). Consequently, approximately 75% of the 60 Indiana bats taken at the Project are expected to be female, for an estimated take of 1.5 female bats/year, or 45 total female bats over the 30-year Project life. A stationary population ($\lambda$=1) within the REA model results in an estimated take of 45.0 adult female Indiana bats over the 30-year Project term, and a lost reproduction of 85.5 female pups, for a total potential impact of take of 130.5 female Indiana bats.

The potential impact of the proposed take over the 30-year life of the Project would be approximately 131 total Indiana bats, according to the REA model. This represents 0.07% of the estimated 2013 population of the OCRU (197,707 Indiana bats) and will be distributed over 30 years. Considering the overall low level of expected take and the compensatory mitigation measures Hoopeston Wind will implement to compensate for the take, it is highly unlikely that the impact of the Project will significantly impact this species. In the event that some of the bats taken at the Project belong to the Midwest Recovery Unit population, overall impacts to this population will be very minimal. In 2013, the Midwest Recovery Unit population was estimated to exceed the OCRU population by 102,968 individuals (USFWS 2013a).

##### 6.4.3.1.2 Northern Long-eared Bat

Research into the sex ratios of northern long-eared bats has been limited. However, there is no evidence to suggest that a 1:1 sex ratio is improbable. Unlike Indiana bats, the northern long-eared bat shows less dispersal from hibernacula (USFWS 2014), suggesting that females and males may be expected to migrate through the Project Area in equal proportions. Consequently, of the 87 northern long-eared bats the REA model estimates could be taken at the Project over the term of the permit, 50% are estimated to be female, for an estimated take of 1 female bat per year.

A stationary population (λ=1) within the REA model results in an estimated take of 30 adult female northern long-eared bats over the 30-year Project term, and lost reproduction of 57 female pups, for a total estimated impact of 87 female bats. The northern long-eared bat population in Illinois has not yet seen the declines that have occurred in the eastern United States. Due to this, and the low level of estimated take, it is likely that overall impacts to the local population from take at the Project will be minimal. Due to the common occurrence of northern long-eared bats at mist-netting sites in the Midwest, it is generally assumed that the range-wide northern long-eared bat population is significantly larger than the range-wide Indiana bat population (534,239; USFWS 2013a). However, even if the northern long-eared bat population were this size, the take resulting from the Project would represent only 0.016% of the estimated population.

#### 6.4.3.2 White-Nose Syndrome

As WNS spreads into and across the Midwest, it may significantly affect the OCRU Indiana bat population as well as the local northern long-eared bat population. WNS is causing severe declines in the populations of cave-hibernating bats throughout eastern North America. The USFWS has estimated that WNS caused a decline of approximately 36% in the Indiana bat Northeast Recovery Unit population between 2007 and 2009 (USFWS 2011c), a decline of approximately 54% between 2009 and 2011 (USFWS 2012b), but populations appear to have steadied between 2011 and 2013, with a 13.3% increase in the Northeast Recovery Unit Population (USFWS 2013a). In addition, there has been a sharp decline in the northern long-eared bat in the northeastern part of its range due to WNS, and WNS has been confirmed on northern long-eared bats (USFWS 2014), indicating that they are highly susceptible to the disease. The decline within surveyed hibernacula from eight states is approximately 99% for the northern long-eared bat (USFWS 2014).

If WNS becomes widespread across the Midwest, and specifically within Illinois, this level of take from the Project would represent a greater proportion of the local populations; however, the level of take experienced by the Project would be expected to decline proportionally. The amount of take that the Project will contribute in addition to losses from WNS would not cause the OCRU Indiana bat population or the local northern long-eared bat population to decline appreciably sooner than it would decline as a result of WNS alone.

# 7.0 Conservation Plan

In issuing an ITP, the USFWS must find, among other things, that the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking.[6] The term “maximum extent practicable” is not defined in the ESA, nor is it defined in any agency regulations.[7] According to some courts, the maximum extent practicable standard does not mean that an applicant must implement all conservation measures that it can afford to implement while still going forward with development.[8] Rather, the “maximum extent practicable” standard means that the conservation measures proposed by the

[6] *See* 50 C.F.R. § 17.22(b)(2)(B).
[7] *See Nat’l Wildlife Fed’n v. Norton*, 306 F. Supp. 2d 920, 927 (E.D. Cal. 2004).
[8] *Id*.

applicant must be commensurate with the level of take under the plan. Stated differently, an applicant for an ITP must demonstrate that its avoidance, minimization, and mitigation measures are commensurate with the anticipated impacts of the take, are rationally based and supported by science, and are reasonably capable of being accomplished. It is only where certain constraints may preclude full minimization or full mitigation that the "practicability" issue needs to be addressed more thoroughly. Here, as will be described, Hoopeston's proposed minimization and mitigation are commensurate with the impact of the taking, and Hoopeston has provided funding assurances to ensure proper implementation of the HCP.

Steps taken to arrive at the conservation plan described herein included defining the biological goals, which include goals to minimize and mitigate impacts to listed species to the maximum extent practicable, and to reduce impacts to all bats by an amount based on best available science, which suggests that a 35% reduction can be attained using turbine operational protocols including raised cut-in speeds and blade feathering. Hoopeston agreed to meet this goal even though non-listed species are not protected under the ESA. Published literature and reviews by experts indicate that raising cut-in speeds is clearly effective at reducing impacts to all bats, although percent reduction is variable and effectiveness at reducing impacts to listed species is uncertain.

As described in Section 7.3.4 below, Hoopeston evaluated intensive monitoring programs using the USFWS Evidence of Absence (EofA) software (Dalthorp 2015), with a goal of 90% confidence after the initial three years of monitoring to ensure that the Project is not exceeding the level of authorized take. Even if no Covered Species are observed during three years of intensive monitoring, the EofA model could predict some level of predicted take given its formulation and use of assumed priors. This, in turn, could trigger an inappropriate adaptive management response (Section 7.4.1). For this reason, Hoopeston will evaluate total bat mortality to determine the estimated take of Covered Species (see Section 7.3.5.1 for methodology). This approach is consistent with the requirement to make use of the best available scientific information when implementing ESA activities because the approach makes use of site-specific monitoring data as well as an intensive monitoring program designed to achieve a 90% confidence after three years of monitoring. The intensive monitoring program is designed to maximize the number of carcasses found by searching large areas frequently (see Section 7.3.4 for details), which will lead to both an increased chance of finding a Covered Species, should one be taken at the Project, as well as an increased level of confidence in the overall bat fatality information collected at the Project. In addition, using site-specific monitoring data in this manner is more consistent with the "No Surprises" rule, which is intended to reduce financial uncertainty and provide assurances to section 10 permit holders that, as long as the permittee is properly implementing the HCP, no additional commitments of resources will be required beyond those specified in the HCP.

## 7.1 Biological Goals and Objectives

The biological goals define the expected outcome of this conservation plan. These goals are broad, representing the guiding principles for operation of the conservation program described in this HCP and forming the basis for the minimization and mitigation strategies employed. The biological objectives represent the steps through which the biological goals will be achieved, and provide a basis for

measuring progress towards and achievement of those goals. The biological goals and objectives of this conservation plan are:

1. To minimize Indiana and northern long-eared bat mortality in the Project Area. The objective of this goal is to implement an operational strategy that will decrease bat mortality by at least 35% from predicted uncurtailed levels, thereby decreasing actual mortality of all bats, and specifically Indiana and northern long-eared bats to no more than 60 individuals of each species over the 30-year permit term.

2. To increase survival and reproductive capacity of Indiana and northern long-eared bats on their summer range, thereby promoting population growth of maternity colonies for both species. The objective of this goal is to implement a mitigation project that will protect and restore habitat in blocks within the range of extant Indiana and northern long-eared bat maternity colonies.

## 7.2 Measures to Achieve Biological Goals and Objectives

### 7.2.1 Minimization of Direct Mortality

All publicly available curtailment studies to date show an inverse relationship between cut-in speeds and bat mortality. Feathering below the manufacturer's cut-in speed is expected to reduce overall bat mortality by a minimum of 35% (Good et al. 2012, Young et al. 2011, Baerwald et al. 2009).

Turbines will be feathered below the manufacturer's cut-in speed of 6.7 mph (3.0 m/s) every night during the bat activity season, from April 1 through October 15. After October 15, migrating Indiana and northern long-eared bats are not expected to occur within the Project Area due to the lack of hibernacula in the vicinity of the Project. Additionally, average nightly temperatures typically begin to decline throughout September, constraining bat activity and inducing bats to enter hibernation (USFWS 2007).

Curtailment actions effective at reducing the risk of collision for all bat species should be at least as effective for the smaller, weaker-flying Indiana and northern long-eared bats, in the event that these species do occur within the Project Area. Therefore, a nighttime cut-in speed of 6.7 mph (3.0 m/s) during the entire bat activity season is expected to minimize take of Indiana and northern long-eared bats. It is conservatively estimated that the proposed curtailment strategy will reduce overall bat fatality, Indiana bat mortality, and northern long-eared bat mortality by at least 35%, although the actual reduction in mortality may be greater.

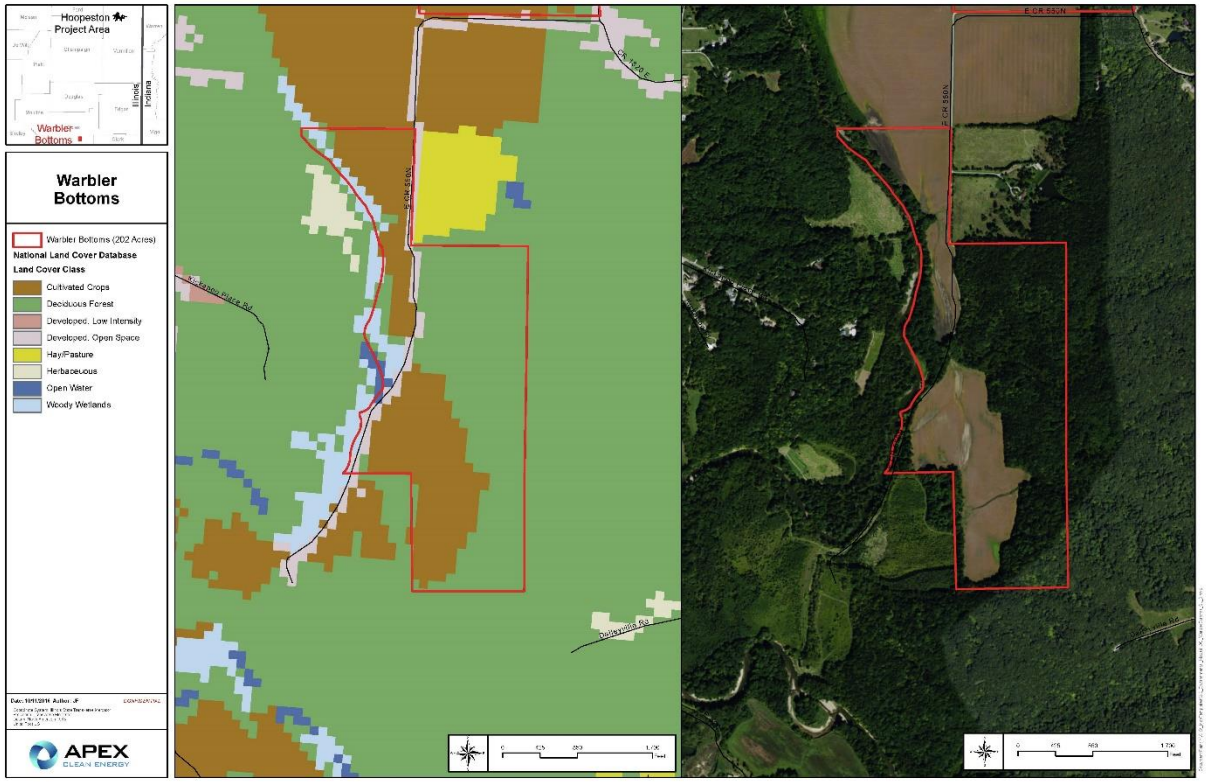
### 7.2.2 Mitigation for the Impacts of the Take

To mitigate for anticipated Project impacts to Covered Species, Hoopeston Wind proposes to fund a specific conservation project for Indiana bats and northern long-eared bats in consultation with the USFWS upon permit issuance. The goal of the mitigation project is to support recovery plan–based conservation projects on no less than 150 acres of mitigation land for Covered Species within the Project vicinity.

Over the ITP term, Hoopeston Wind estimates that 60 northern long-eared bats and 60 Indiana bats may be taken as a result of Project operations. Hoopeston Wind has developed and is implementing operational and construction protocols to avoid and minimize the majority of potential project impacts. Remaining, and likely minor, Project impacts will be mitigated through offsite conservation measures. The mitigation is based upon the impact of the take (see Section 6.4.36), specifically the lost reproduction of adult female bats.

During the development of this HCP, Hoopeston Wind worked with USFWS to evaluate options for conservation projects that could be undertaken as a part of this HCP. Hoopeston Wind identified property under the ownership and management of Grand Prairie Friends, a nonprofit conservation organization. The property is located in Coles County, Illinois, about 60 miles southwest of the Project, and consists of forested lands, wooded riparian areas, and agricultural lands (Figure 3). The property is located about 46 miles from the nearest known northern long-eared bat record (near Newman, Illinois), and about 25 miles from the nearest known Indiana bat capture (near Olivet, Illinois).

**Figure 3: Location and Habitat Characteristics of Proposed for Mitigation Lands.**




Hoopeston Wind will work in partnership with Grand Prairie Friends and in consultation with the USFWS to implement a mitigation project consistent with this HCP. Initially, Hoopeston Wind will conduct a bat habitat assessment on mitigation lands with Grand Prairie Friends to evaluate the quality and quantity of habitat, and to identify 150 acres of habitat on this property that would benefit from enhancement/restoration

activities. Thereafter, Hoopeston Wind will consider a combination of activities that enhance/restore summer habitat. Activities for enhancement/restoration could include, but may not be limited to, tree planting and management, installation of habitat features (e.g., BrandenBark©), native grass plantings, mowing around trees to reduce competition and impede weed growth, stand thinning, girdling to create roost trees, understory thinning, invasive species control, prescribed fire, selective harvesting, and/or supplemental plantings.

In arriving at the proposed amount of mitigation, Hoopeston Wind considered the results of the REA model developed by the USFWS (USFWS 2013c) to assess the impact of proposed take on listed bat species. The REA model provides useful information regarding potential benefits of different mitigation options, including summer habitat acquisition and protection, summer habitat restoration, and winter habitat acquisition and protection. Since wooded habitats in this area are limited, forest restoration efforts (which include permanent protection as well) are equal in value to preservation measures, so any combination of restoration or protection totaling 150 acres (60.7 ha) will be sufficient based on the estimated impact of take (see Section 6.4.3) and the stacking of mitigation credits such that mitigating for the impact of take on Indiana bats is sufficient for the northern long-eared bats as well.

Based upon communications with Grand Prairie Friends, Hoopeston Wind estimates that it can enhance suitable habitat for the Covered Species on this privately owned land within the OCRU at a cost of about $3,000 per acre or less. This amount would cover the cost of implementing bat conservation actions on owned land, including, but not limited to those described above. Based on these estimates, Hoopeston Wind concludes that at a cost of $450,000, it could restore or enhance at least 150 acres (60.7 ha) of bat habitat; therefore, conservation actions will be funded in an amount sufficient to enhance or restore at least 150 acres (60.7 ha), and treatments may include tree planting, management, and maintenance. These conservation actions will occur in areas that would not otherwise be enhanced.

Hoopeston Wind will develop a mitigation implementation plan in consultation with Grand Prairie Friends and USFWS and finalize this plan within 12 months of issuance of the ITP. This implementation will set forth the schedule and sequencing for specific habitat enhancement activities to be undertaken with Grand Prairie Friends under the HCP.

The goal of the mitigation project is to contribute to the conservation of Covered Species by enhancing suitable habitat for the Covered Species. The following guidelines will be used to develop the mitigation plan:

- The proposed project will substantially reduce the threats to Covered Species;
- The mitigation plan will describe the recovery objectives and include anticipated dates for achieving those objectives, within the anticipated 12-month implementation period;
- The project will consist of enhancement and restoration activities that are not otherwise planned within the implementation area;
- The project will incorporate quantifiable, scientifically valid standards that will demonstrate achievement of recovery objectives;

- The project will provide benefit to the Covered Species for the life of the ITP by avoiding impacts associated with natural disasters, including disease, fires, blow downs, pests, and floods;
- The project will be monitored and reported to ensure implementation and effectiveness; and
- The project will be consistent with recovery plans or other pertinent scientific literature applicable to the Recovery Unit.

Other specific terms of the mitigation project include the following:

Payment Terms. Within 90 days following issuance of the ITP, Hoopeston Wind will make a payment of $450,000 to a segregated conservation fund administered by a third party selected by Hoopeston Wind and USFWS. Hoopeston Wind will work, in consultation with the USFWS, to secure a project (or projects) that achieve the expected biological benefits. If a project is implemented at a lower cost, the unused portion of the fund will be refunded to Hoopeston Wind. The conservation funds will be separate from the third party's day-to-day operations. Hoopeston Wind and the third party shall execute an agreement to ensure implementation of the mitigation projects consistent with this HCP.

Administration. The conservation fund will be administered by a USFWS-approved escrow agent or qualified conservation organization (such as Grand Prairie Friends). Fees associated with fund administration will not materially diminish the amount of the conservation fund.

Eligible Projects. Money will be disbursed from the conservation fund at the direction of Hoopeston Wind to fund projects that meet the goals, objectives, and criteria identified above. A mitigation plan will be developed in consultation with USFWS within 12 months of permit issuance to enable prompt implementation of mitigation projects.

Reporting. Hoopeston Wind will submit to USFWS and IDNR by April 30 of each year an annual report detailing expenditures made during the preceding calendar year and the current balance of the funds until funds are fully expended. The conservation fund administrator and Hoopeston Wind will each certify the accuracy of information contained in this report, which shall include details (i.e., photographs, maps, project targets and standards) about what projects are ongoing or have been completed. These reports are intended to help USFWS ensure that adequate funding will be provided to implement the HCP and that funding sources at the required annual levels are reliable and will meet the purposes of the HCP.

Basis for Bat Conservation Fund Amount. Hoopeston Wind estimates that up to 60 northern long-eared bats and 60 Indiana bats may be taken during the 30-year permit term. Monitoring conducted at the Project has not identified any priority bat habitats on Covered Lands (e.g., winter hibernation or summer maternity colonies), and disturbed agricultural habitat is common within the region. Therefore, permanent habitat disturbance associated with project construction is not expected to measurably increase the Project's estimated level of take of Covered Species. By focusing on a conservation project that protects or enhances priority habitat for reproductive females, the proposed conservation project will sufficiently mitigate the Project's permitted level of take.

## 7.3 Mortality Monitoring and Reporting

Hoopeston Wind is currently conducting post-construction monitoring under the protocols outlined in the Project's BBCS (Apex 2013) and in accordance with the requirements of the TAL issued for the Project on March 4, 2014. This monitoring includes spring monitoring under the current spring operational protocols, which will not be changed under the HCP; however, post-construction monitoring under the ITP will involve "intensive monitoring" during the first three years of operations under the ITP, check-in monitoring during years 15, 16, and 17 of operation under the ITP, and annual monitoring of roads and pads during the life of the permit. The goal of the intensive monitoring is to verify that allowable take levels have not been exceeded during the intensive monitoring period, and thus have a high degree of confidence that operation of the Project beyond the third year is compliant with the ITP.

### 7.3.1 Background and Goals

A detailed post-construction monitoring plan has been developed for the Project in coordination with USFWS to provide a means of monitoring and ensuring compliance with the take numbers estimated in this HCP and authorized in the ITP, and assessing the effectiveness of the HCP in meeting the biological objective of minimizing direct mortality to Indiana and northern long-eared bats set forth in Section 7.2.2 of this HCP. Included in the post-construction monitoring plan are standardized carcass searches, searcher efficiency trials, and carcass removal trials. The goals of the post-construction monitoring are to determine overall bat fatality rates from the Project, estimate Indiana and northern long-eared bat mortality at the species level, and evaluate the circumstances under which fatalities occur. Post-construction monitoring results will also provide triggers for adaptive management, as described in Section 7.4.

### 7.3.2 Species to be Monitored

The post-construction monitoring plan will address all bat fatalities observed within the Project Area. Based on the analysis provided in Section 6, Indiana and northern long-eared bat mortalities are expected to occur only rarely, if at all; therefore, the monitoring plan is designed to detect carcasses of all bird and bat species and calculate bat fatality estimates with enough precision to determine if the operational curtailment protocols are effective in reducing overall bat fatalities at the Project. The monitoring plan is also designed to enable comparison with other operating wind energy projects. Within the overall bat fatality estimates, estimates by species will be made, if possible, based on the number of carcasses detected.

### 7.3.3 Wildlife Handling Procedures

All potential state or federal-listed bat carcasses found will be labeled with a unique number, individually bagged, and retained in a freezer at the Project O&M building for identification to species. For *Myotis* specimens that cannot be confirmed, DNA sampling and analysis will be completed. A copy of the original data sheet for each carcass will be placed in the bag with each frozen carcass. The carcasses of non-listed species may be collected and used in searcher efficiency and carcass removal trials; however, mice purchased through a commercial source may be used as a surrogate. In the event that a carcass of an

ESA- or state-listed species is found, Hoopeston Wind will notify the appropriate authorities within 48 hours of positive species identification. If an injured bat is found, the animal will be sent to a local wildlife rehabilitator, when possible.

## 7.3.4 Monitoring Protocols

### 7.3.4.1 Study Design

Hoopeston Wind will implement monitoring during the life of the Project that consists of intensive monitoring during the first three years of operations under the ITP, check-in monitoring during years 15 and 16 of operations under the ITP, and annual monitoring during the life of the Project. The intensive monitoring will include transect surveys of 40-m-radius circular plots (approximately 5,024 $m^2$ each) centered on the turbine and of road and pad areas (approximately 519 $m^2$ each), with the road portion extending out 95 m from the base of the turbine along a visible road surface that is 4.9 m wide and with the cleared pad around the base of the turbine extending 3.05 m. Larger plot sizes will be considered in year 2 of the ITP if the USFWS determines available information suggests the need to expand plot sizes.

Each monitoring period is summarized in Table 7-1 and described below.

**Table 7-1. Summary of Proposed Monitoring Protocols and Schedule**

| Monitoring Type | Years | Season (Dates) | Frequency | Plots |
|---|---|---|---|---|
| Intensive Monitoring Years 1–3 | | Spring (Apr 1 to May 15) | 1x/week | 5 full plots (40 m radius) and 44 roads and pads (95 m radius from turbine) |
| | | Fall (Aug 1 to Oct 15) | 2x/week | 15 full plots and 34 roads and pads |
| Annual Monitoring | Years 1–30 | Spring, Summer, Fall (Apr 1 to Oct 15) | 1x/week | 49 roads and pads |
| Check-in Monitoring | Years 15 and 16 | Spring (Apr 1 to May 15) | 1x/week | 5 full plots and 44 roads and pads |
| | | Fall (Aug 1 to Oct 15) | 2x/week | |
| Adaptive Management | Years 1-30 | Season Triggered | 3x/week | 49 roads and pads |

#### 7.3.4.1.1 Intensive Monitoring (Fall and Spring)

Hoopeston Wind evaluated intensive monitoring programs using the USFWS EofA software (Dalthorp et al. 2014), with a goal of 90% confidence after the initial three years of monitoring to ensure that the Project is not exceeding the level of authorized take. Given the take estimate of 2 Indiana bats and 2 northern long-eared bats per year, this will be a limit of 6 estimated bats of each species over the three-year monitoring period.

To determine the survey effort required to achieve this level of confidence, Hoopeston Wind assumed that the fall monitoring period was the period of highest risk and applied the EofA concept during this period.

The fall period is 91 days long (covering the 13-week period from August 1 through October 15), searcher efficiency was assumed to change (k) by 0.8 with each search, and carcass persistence was assumed to average 10 days using the exponential distribution. Additionally, a uniform prior distribution and uniform arrival function, both set to the EofA defaults, were used.

Based on studies conducted at the Fowler Ridge Wind Farm in Indiana, it was estimated that 70.6% of fatalities fall within 40 m of a turbine, giving an area adjustment for full plots of 0.706. Based on studies Stantec has conducted in similar landscapes, the area adjustment for roads and pads was estimated at 0.233. Searcher efficiency was assumed to be 0.9 for roads and pads, and 0.6 for full plots.

Scenarios were run through the EofA "Design Tradeoffs" function to determine detection probability (g) and then through the "Multi-year Total" function to determine the 90% credible maximum after three years of monitoring, assuming no listed bats are found.

Based on the EofA analysis, Hoopeston Wind will use a search protocol involving 70% roads and pads (34 turbines) and 30% full plots (15 turbines), with searches occurring twice weekly from July 15 through October 15. This will result in an overall detection probability of 0.292 and a 90% confidence that 6 or fewer Indiana bats and 6 or fewer northern long-eared bats were taken during the first three years of operation under the ITP assuming that no listed bats are found during the monitoring. If a Covered Species is found, or the estimated fatality of either Covered Species is greater than 2 bats/year, adaptive management will be implemented as discussed in Section 7.4.

In addition to the fall monitoring, Hoopeston will also monitor during spring (April 1–May 15) during the first three years of operations as part of the intensive monitoring program. During the spring periods, Hoopeston Wind will use a search protocol involving 90% roads and pads (44 turbines) and 10% full plots (5 turbines), with searches occurring once weekly. This monitoring will begin in the first spring after issuance of the ITP, and 2 years of monitoring will occur under the ITP. Also, as described in Section 7.2.4.1.2, annual monitoring will also occur during summer (May 15 to July 15) in years 1-3 of the ITP.

#### 7.3.4.1.2 Annual Monitoring

Annual monitoring will be completed during the bat active season (April 1 to October 15) by operations staff that will be required to search for bat carcasses or a qualified consultant. A qualified party will collect carcasses for identification when required. All bat carcasses will be identified by a permitted bat biologist. Operations staff will be informed of the timing of spring/fall standardized searches and, in the event that they find a carcass or injured bat during these survey periods, these personnel will be trained to record and report the find without contact that might introduce bias to standardized searches and associated fatality rate estimates.

During years in which no intensive monitoring or check-in monitoring is occurring (i.e., years 4–14 and 17–30 of the ITP), annual monitoring will include weekly searches of all roads and pads during the bat active period. Mean searcher efficiency and carcass removal trial data from years 1-3 will be used to determine the total estimated site mortality, as described in Section 7.3.4.3; however, if annual variability is considered high, bias trials will be completed every two years or as recommended by USFWS to

improve accuracy of fatality estimates. The results of these surveys will be used to determine whether any adaptive management changes (Section 7.4) are necessary.

#### 7.3.4.1.3 Check-in Monitoring

After the initial intensive monitoring, period to be determined by adaptive management {see Section 7.4]),and in addition to the annual monitoring completed during all years, the Project will implement check-in monitoring during years 15 and 16 of operations. Check-in monitoring will consist of weekly searches of 5 (10%) of the turbines with cleared 40-m-radius plots and 44 (90%) of turbine roads and pads out to 95 m during spring (Apr 1-May 15) and twice weekly searches during fall (August 1-October 15). Check-in monitoring will be undertaken by a qualified environmental consulting firm.

#### 7.3.4.1.4 Adaptive Management Monitoring

In the event adaptive management actions are triggered as described in Section 7.4 or 8.1.2.5, the Project will implement Adaptive Management monitoring (see Tables 7-2, 7-3 and 8-1). Adaptive Management monitoring will consist of three times weekly searches of turbine roads and pads out to 95 m during the season in which the adaptive management action is triggered.

Hoopeston evaluated various monitoring approaches in arriving at the Adaptive Management monitoring plan described above using several tools, including currently available Evidence of Absence software. Hoopeston determined that Adaptive Management monitoring produced similar detection probabilities compared with check-in monitoring described in Table 7-1, across a range of carcass persistence assumptions. Detection probabilities were actually slightly higher under Adaptive Management monitoring than for intensive monitoring at low carcass persistence levels.

### 7.3.4.2 Field Methods

#### 7.3.4.2.1 Standardized Carcass Searches

At 40-m-radius cleared-plot turbines, 7 transects will be spaced at approximately 16.4 ft (5 m) intervals. Observers will walk at a rate of approximately 2 mph (45 to 60 m per minute), scanning the ground for carcasses within 10 ft (3 m) of each transects. The observer will start at one side of the circular plot and systematically search in a north/south or east/west direction, switching the search pattern on a weekly basis. At road/pad turbines, the observer will walk the access road starting at 312 ft (95 m) from the turbine and walk toward the turbine, around the turbine, and back towards their vehicle searching the 16-ft (4.09-m)-wide unvegetated road surface until the entire road/access pad is searched.

Hull and Muir (2010) analyzed carcass finds and modeled the ballistics from similar turbines (312 ft or 95 m in height) and showed that 99% of all bat carcasses were found within 218 ft (66.5 m) of the turbine base; therefore, Hoopeston Wind will initially survey roads out to a conservative 312 ft (95 m) from the turbine base to evaluate the area correction factor assumed in Section 7.3.4.1.1 and potentially adjust it to become a site-specific area adjustment factor used in estimating facility-wide fatality rates if results indicate adjustment is appropriate. Information on carcass distributions will be discussed with USFWS and IDNR to determine how far from the turbine base future road and pad searches should be after the three years of intensive monitoring, or once enough carcasses have been collected to calculate an accurate site-specific area adjustment.

Carcass searches during intensive monitoring and check-in monitoring will be conducted by qualified biologists, under applicable permits and experienced in conducting fatality search methods, including proper handling and reporting of carcasses. Searchers will be familiar with and able to accurately identify bat species likely to be found in the Project Area. Carcass searches during annual monitoring will be conducted by operations staff trained in these methods, under applicable permits. Any unknown bats or suspected Indiana or northern long-eared bats discovered during fatality searches will be sent to a qualified USFWS-approved bat expert for positive identification, or DNA analysis will be completed.

For all carcasses found, data recorded will include:

- Date and time,
- Initial species identification,
- Sex, age, and reproductive condition (when possible),
- Global positioning system (GPS) location,
- Distance and bearing to turbine,
- Substrate/ground cover conditions,
- Condition (intact, scavenged),
- Any notes on presumed cause of death, and
- Wind speeds and direction and general weather conditions for nights preceding search.

A digital picture of each detected carcass will be taken before the carcass is handled and removed. Bird carcasses will be documented in place and not removed unless identity cannot be confirmed. Digital photographs and location information of all bird carcasses will be taken and used for confirming identification when necessary. As previously mentioned, all bat carcasses will be labeled with a unique number, bagged, and stored frozen as needed for future studies (with a copy of the original data sheet) at the Project O&M building.

Bat carcasses found in non-search areas or time periods will be coded as “incidental finds” and documented as much as possible in a similar fashion to those found during standard searches. Maintenance personnel will be informed of the timing of standardized searches and, in the event that maintenance personnel find a carcass or injured animal, these personnel will be trained on the collision event reporting protocol. Any carcasses found by maintenance personnel will also be considered incidental finds. Incidental finds will be included in survey summary totals but will not be included in the corrected mortality estimates because the lack of standardized search effort and search area as well as the lack of searcher efficiency and carcass removal trials prohibits calculations to account for bias and extrapolate incidental carcasses found to estimated fatalities.

#### 7.3.4.2.2 Searcher Efficiency and Carcass Removal Trials

To assess carcass persistence, approximately 40 bat carcasses will be randomly placed within survey areas at varying times during the intensive monitoring, annual monitoring, and check-in monitoring periods. Hoopeston Wind and its contractors will rely on contacts with veterinary labs and universities that

can provide bat carcasses and/or use of bat carcasses collected on-site during monitoring studies; however, in the event that 40 are not available, brown mice or small black rats will be used as surrogates for bat carcasses. The carcasses will be placed on a minimum of two dates during each season, thereby spreading the trials throughout the survey period to incorporate the effects of varying weather, climatic and vegetation conditions, and scavenger types and densities. Carcasses will be dropped from waist high or higher and allowed to land in a random posture. Each trial carcass will be discreetly marked (with tape or thread) prior to placement so that it can be identified as a study carcass if it is found by observers or wind facility personnel, or moved by a scavenger.

Observers conducting carcass searches will monitor the trial bats over a 14-day period according to the following schedule as closely as possible. Carcasses will be checked every day for the first 4 days, and then on days 7, 10 and 14. This schedule may vary slightly depending on weather and coordination with the other survey work. At each visit, the observer will note the condition of the carcass (e.g., intact, scavenged, complete). Trial carcasses will be left at the location until the end of the 14-day trial or until the carcass is removed entirely by scavengers. After 14 days, any remaining evidence of the carcasses will be removed.

Searcher efficiency trials will be completed concurrent with scavenger trials using the same test subjects as used in carcass persistence trials. Searchers will be unaware of the placement of the test subjects done on the morning of turbine searches. Test subjects will be checked after searcher efficiency trials to ensure the subjects were present at the time of the trial. These carcass removal and searcher efficiency trials will be used to adjust estimates of bat fatalities using contemporary equations for estimating fatality.

#### 7.3.4.3 Statistical Methods for Estimating Fatality Rates

The currently proposed methodology for estimating overall bat fatality rates largely follows the estimator proposed by Erickson et al. (2003), as modified by Young et al. (2009); however, if more appropriate estimators are available at the time the monitoring work is completed, they will be used if agreed upon with USFWS.

The proposed estimation technique would follow Erickson et al. (2003), in which the estimate of the total number of wind turbine-related casualties will be based on four components: (1) observed number of casualties, (2) searcher efficiency, (3) scavenger removal rates, and (4) estimated percent of casualties that likely fall in non-searched areas, based on percent of area searched around each turbine. Variance and 90% confidence intervals will be calculated using bootstrapping methods (Erickson et al. 2003 and Manly 1997 as presented in Young et al. 2009).

Mean Number of Observed Casualties (c)
The estimated mean observed number of bat casualties (c) per turbine per study period will be calculated as:

$$c = \frac{\sum_{j=1}^{n} c_j}{n}$$

where n is the number of turbines searched, and $c_j$ is the number of casualties found at a turbine. Incidental mortalities (those found outside of the searched area or by maintenance personnel) will not be included in this calculation, nor in the estimated fatality rate.

#### 7.3.4.3.1 Estimation of Searcher Efficiency Rate (p)

Searcher efficiency (p) will represent the average probability that a carcass was detected by searchers. The searcher efficiency rates will be calculated by dividing the number of trial carcasses observers found by the total number that remained available during the trial (non-scavenged). Searcher efficiency will be calculated for each season and for all search methods (i.e., roads and pads, full plots).

#### 7.3.4.3.2 Estimation of Carcass Removal Rate (t)

Carcass removal rates will be estimated to adjust the observed number of casualties to account for scavenger activity at the Project Area. Mean carcass removal time (t) will represent the average length of time a planted carcass remained at the Project Area before it was removed by scavengers. Mean carcass removal time will be calculated as:

$$t = \frac{\sum_{i=1}^{s} t_i}{s - s_c}$$

where s is the number of carcasses placed in the carcass removal trials and $s_c$ is the number of carcasses censored. This estimator is the maximum likelihood (conservative) estimator assuming the removal times follow an exponential distribution, and there is right-censoring of the data. Any trial carcasses still remaining at 30 days will be collected, yielding censored observations at 30 days. If all trial carcasses are removed before the end of the search period, then $s_c$ will be zero and the carcass removal rate will be calculated as the arithmetic average of the removal times. Carcass removal rate will be calculated for each season and for all search methods (i.e., roads and pads, full plots).

#### 7.3.4.3.3 Search Area Adjustment

Approximation of *A*, the adjustment for areas that were not searched, will be adapted from the Erickson et al. (2003) estimator, as modified by Young et al. (2009), to accommodate differences in carcass search study design. For the Project fatality estimates, *A* will represent the adjustment for the proportion of carcasses that likely fell outside of the area searched. The value for *A* will be approximated using the following formula, or a variation thereof:

$$\mathrm{A} = \frac{\left(\frac{C_{RP}}{P_{RP} * S_{RP}}\right) + \left(\frac{C_{FP}}{P_{FP} * S_{FP}}\right)}{\left(\frac{C_{RP}}{P_{RP}}\right) + \left(\frac{C_{FP}}{P_{FP}}\right)}$$

where $C_{RP}$ is the number of observed casualties on roads and pads, $C_{FP}$ is the number of observed casualties on full plots, $P_{RP}$ is the searcher efficiency on roads and pads, $P_{FP}$ is the searcher efficiency on full plots, $S_{RP}$ is the proportion of roads and pads searched across all study turbines, and $S_{FP}$ is the proportion of full plots searched across all study turbines. For intensive monitoring, $S_{RP}$ = 0.7 and $S_{FP}$ = 0.3, as roads and pads will be searched at 70% of the study turbines and full plot searches will be conducted at the remaining 30% of the study turbines. For spring monitoring and check-in monitoring, $S_{RP}$ = 0.9 and $S_{FP}$ = 0.1, as roads and pads will be searched at 90% of the study turbines and full plot

searches will be conducted at the remaining 10% of the study turbines. For the annual monitoring, area adjustments for roads and pads will utilize the most recent area adjustments calculated for the Project (i.e., in years 4–14 the area adjustment factors from intensive monitoring and spring monitoring will be utilized, in years 18–30 the area adjustment factors from check-in monitoring will be utilized).

To adjust for the carcasses that fall outside of the 40-m full plots, a distance-based carcass density model for carcasses found on the roads and pads will be used to calculate a site-specific area adjustment (Huso and Dalthorp 2014). This will use data from the first three years of intensive monitoring, when roads and pads are searched out to 312 ft (95 m; see Section 7.3.4.2.1).

#### 7.3.4.3.4 Estimation of the Probability of Carcass Availability and Detection (π)

Searcher efficiency and carcass removal rates will be combined to represent the overall probability (π) that a casualty incurred at a turbine would be reflected in the post-construction mortality study results. This probability will be calculated as:

$$\pi = \frac{t \cdot p}{I} \cdot \left[ \frac{\exp\left({}^{I}/_{t}\right) - 1}{exp\left({}^{I}/_{t}\right) - 1 + p} \right]$$

where I is the interval between searches. For this study, I=3.5 for intensive monitoring carcass searches and I=7 for annual monitoring, check-in monitoring, and spring monitoring carcass searches.

#### 7.3.4.3.5 Estimation of Facility-Related Mortality (m)

Mortality estimates will be calculated using the estimator proposed by Erickson et al. (2003), as modified by Young et al. (2009). The estimated mean number of casualties/turbine/study period (m) will be calculated by dividing the estimated mean observed number of casualties/turbine/study period (c) by π, an estimate of the probability a carcass was not removed and was detected, and then multiplying by A, the adjustment for the area within the search plots which was not searched:

$$m = A \cdot \frac{c}{\pi}$$

## 7.3.5 Data Analysis, Reporting, and Consultation

### 7.3.5.1 Data Analysis

Analysis of data collected during the post-construction mortality monitoring will include season fatality estimates for all bats to the taxonomic level where fatality estimates can be calculated (i.e., it is difficult to calculate representative fatality rates from small numbers of carcasses, so species- and genus-level fatality calculations may not be possible for some species/genera).

To evaluate compliance with the ITP, total bat mortality at the site will be evaluated each year, and trends in bat mortality over time will be analyzed to compare annual check-in monitoring with the results from the first three years of intensive monitoring. If incidental finds of listed species are recorded, they will be considered in evaluating potential compliance with the ITP.

Overall bat mortality at the Project will be analyzed using a single estimator for consistency throughout the plan (i.e., Schoenfeld). If new information becomes available, Hoopeston Wind should work with USFWS to evaluate the utility of a new estimator or information. Similar to how the take of Covered Species was estimated, it is assumed that take of Covered Species will represent some proportion of overall bat fatality (see Section 6.4.2.1).

Based on the three take estimation methods used (see Section 6.4.2) and the species composition for the Covered Species under each method, Indiana bat fatality is expected to represent 0.29% of all bat fatalities (average of the Fowler-based Approach [0.16%], Arnett-Baerwald Approach [0.01%] and Acoustics Approach [0.7%]), and northern long-eared bat fatality is expected to represent 0.24% of all bat fatalities (average of the Fowler-based Approach [0.08%], Arnett-Baerwald Approach [0.05%] and Acoustics Approach [0.6%]).

### 7.3.5.2 Reporting

Hoopeston Wind will provide an annual mortality monitoring report to the USFWS by April 1 of each year of the permit summarizing the results of post-construction monitoring occurring during the prior calendar year. The report will include fatality estimates, data summaries, and assessment of correlations between fatality rates and potentially influential variables such as weather, location, turbine operation, etc. Fatalities will be expressed both in terms of fatalities/turbine/season and in terms of fatalities/MW/season, as recommended by the USFWS's LWEG (USFWS 2012a) to facilitate comparison with other studies. The reports will include all data analyses, including correlation analyses and overall fatality estimates, and a discussion of monitoring results and their implications.

In addition to the mortality monitoring reports, Hoopeston Wind will promptly report fatalities of ESA-listed species or eagles to the USFWS. Hoopeston Wind will report the discovery of any actual Indiana bat or northern long-eared bat fatalities to the USFWS within 48 hours of discovery. In the event that estimated Indiana or northern long-eared bat mortality exceeds the thresholds set forth in Table 7-2, adaptive management measures will be implemented as specified, informed by the relevant variables identified in the fatality monitoring report. Hoopeston Wind will implement adaptive management actions in Table 7-2 for northern long-eared bats as described in Section 7.4 below.

The proposed take limit has been established at no more than 60 Indiana bats and no more than 60 northern long-eared bats over the 30-year life of the permit, based on an expected average take of 2 Indiana bats and 2 northern long-eared bats per calendar year. Hoopeston Wind will implement adaptive management measures based on these annual expected take averages to provide assurance that total authorized levels of take will not be exceeded. Any adaptive management measures implemented shall be described in the annual fatality monitoring report.

## 7.4 Adaptive Management

Adaptive management is a process through which Hoopeston Wind can modify operational protocols outlined in this HCP to reflect new information or changing conditions in order to minimize take and ensure conservation of Indiana and northern long-eared bats, while minimizing effects on the operation of

the Project. Hoopeston Wind will use adaptive management to minimize take associated with the operation of the Project, and to promote the long-term survival of both the Indiana and northern long-eared bats. Impacts will be analyzed using the best available science at that time, including scientific advancements made since issuance of the ITP. Analysis may include items such as timing of fatalities, location of fatalities, other circumstances (e.g., weather) as well as the actual take estimate. In addition to the conservation measures proposed below, additional conservation measures may be implemented if research suggests that they may be successful in reducing the level of take at the Project.

Adaptive management will allow Hoopeston Wind to minimize the uncertainty associated with gaps in scientific information or biological requirements. Information used in the adaptive management process will come from the post-construction mortality monitoring activities described in Section 7.3. Monitoring data will be analyzed to determine if the objectives of this HCP are being met. If the conservation measures are not producing the desired results, adjustments will be made to the HCP as necessary and in consultation with the USFWS to achieve the biological objectives of this HCP.

If no Covered Species (i.e., Indiana bat and northern long-eared bat) are detected during the first three years of monitoring (intensive monitoring period) and estimated fatalities of Covered Species are at or below 2.0 per year of each species (see Section 7.3.5.1 for methodology), then Hoopeston Wind will continue this operational program during the remaining term of the ITP unless specified adaptive management triggers are met.

### 7.4.1 Adaptive Management Triggers and Responses

If Covered Species are discovered during the first three years of monitoring, or if Covered Species are discovered during annual check-in monitoring, then Hoopeston Wind will notify USFWS within 48 hours of positive species identification (or if a suspect carcass is found) to evaluate available data concerning the discovery, potential cause of the fatality, and appropriate additional adaptive management actions if necessary If no Covered Species are observed, the estimated total bat mortality will be evaluated to determine the estimated take of both Covered Species (see Section 7.3.5.1 for methodology), and these estimates will be evaluated to determine whether it is in compliance with the ITP. Tables 7-2 and 7-3 outline specific adaptive management triggers and responses in view of carcass discoveries and associated Indiana and northern long-eared bat fatality estimates.

On January 14, 2016, the USFWS published a final ESA 4(d) rule for NLEB exempting incidental take occurring at wind projects from Section 9 take prohibitions with minor exceptions (81 Fed. Reg. 1900; USFWS 2016c). The USFWS concluded this 4(d) rule was necessary and advisable due to the infrequent and insignificant impact of wind energy operations on NLEB. In view of this development, the Applicant proposes to implement NLEB-specific adaptive management triggers as described in Table 7-3 until such time that take of this species is prohibited at wind energy projects.

In order to account for the annual variability of take, and to avoid making decisions based on an annual outlier result and given the rarity of incidental take, the adaptive management triggers are based on the average over a three-year rolling time period. The average over three years accounts for annual variability and helps ensure that decisions are made based on the expected normal conditions at the

Project. In addition, it also identifies if changes in the trend in bat mortality are occurring over time, for example increasing or decreasing, that a single year estimate would not account for. Using a three-year rolling average accounts for annual variability in incidental take and changes in trends in the take over time before triggering an adaptive management response. In this manner, decisions are made at an appropriate time scale, while still allowing Hoopeston Wind sufficient time over the Permit term to make adjustments to the minimization measures to maintain permit compliance.

**Table 7-2. Indiana Bat Adaptive Management Triggers and Responses.**

| Trigger for Adaptive Management | Immediate Response | Adaptive Management Response |
|---|---|---|
| 3-year rolling average of estimated Indiana bat mortality ranges from 2.0 to 4.0. | • Meet and confer with USFWS in advance of next monitoring period to evaluate available project-specific and/or other data on the potential cause of the fatalities, and determine the appropriate scope of additional adaptive management actions. | • Increase cut-in speed by increments of 1.1 mph (0.5 m/s) with the intent of bringing take down to expected annual levels (2 per year) at all Project turbines 7 days on either side of the mortality event(s). If take exceedance is calculated and no actual carcasses are in-hand, cut-in speed adjustments will occur during the two-week period in which all bat fatalities are the highest. Cut-in speeds will be raised at all Project turbines by 0.5 m/s unless the Applicant demonstrates with available data that raising cut-in speeds at fewer turbines will be at least as effective.<br>• Implement Adaptive Management Monitoring"[1] during the appropriate season for 2 additional years. Such monitoring will be project-wide unless the applicant demonstrates with available data that monitoring at fewer turbines will be at least as effective.<br>• Review and update, as necessary, monitoring protocols to assess the conservation value of blade feathering.<br>• Implement other appropriate measures to address the identified issue based on the best available science. |

| | | |
|---|---|---|
| 3-year rolling average of estimated Indiana bat mortality is greater than 4.0. | • Meet and confer with USFWS in advance of next monitoring period to evaluate available project-specific and/or other data concerning the potential cause of the fatalities, and determine the appropriate scope of additional adaptive management actions. | • Increase cut-in speed by increments of 1.0 m/s with the intent of bringing take down to expected annual levels (2 per year) at all Project turbines, 7 days on either side of the mortality event(s). If take exceedance is calculated and no actual carcasses are in-hand, cut-in speed adjustments will occur during the two-week period in which all bat fatalities are the highest. I<br>• Cut-in speeds will be raised at all Project turbines by 1.0 m/s unless the applicant demonstrates with available data that raising cut-in speeds at fewer turbines will be at least as effective.<br>• Implement Adaptive Management Monitoring[1] during the appropriate season for 2 additional years. Such monitoring will be project-wide unless the applicant demonstrates with available data that monitoring at fewer turbines will be at least as effective.<br>• Review and update, as necessary, monitoring protocols to assess the conservation value of blade feathering.<br>• Implement other appropriate measures to address the identified issue based on the best available science. |
| The predicted future take of Indiana bat, based on the remaining term of the permit, is likely to exceed the authorized amount. | • Meet and confer with USFWS in advance of next monitoring period to evaluate available project-specific and/or other data concerning the potential cause of the fatalities, and determine the appropriate scope of additional adaptive management actions. | • Evaluate with the USFWS adjusting operational protocols to further increase cut-in speeds during the appropriate period to stay within authorized levels of permitted take. Cut-in speeds will be adjusted to a level such that predicted future take does not exceed authorized amount as demonstrated by the Applicant and approved by the Service.<br>• Evaluate with USFWS the installation of proven, cost-effective bat deterrent devices at the turbine or group of turbines implicated in the find, should that technology become commercially available.<br>• Implement additional Adaptive Management |

| | | |
|---|---|---|
| | | Monitoring[1] at all or the adjusted turbines during the adjusted period for 2 additional years. |

[1] Adaptive Management Monitoring consists of three times weekly monitoring at 49 roads and pads (95 m radius from turbine) during the appropriate season.

**Table 7-3. Northern Long-eared Bat Adaptive Management Triggers and Responses.**

(Note: Adaptive management responses in this table will apply to NLEB until the species becomes subject to section 9 take prohibitions in the future.)

| Trigger for Adaptive Management | Immediate Response | Adaptive Management Response |
|---|---|---|
| 3-year rolling average of estimated northern long-eared bat mortality ranges from 4.0 to 6.0. | • Meet and confer with the USFWS in advance of next monitoring period to evaluate available project-specific and/or other data concerning the potential cause of the fatalities, and determine the appropriate scope of additional adaptive management actions. | • Increase cut-in speed by increments of 1.1 mph (0.5 m/s) with the intent of bringing take down to expected annual levels (2 per year) at all Project turbines 7 days on either side of the mortality event(s). If take exceedance is calculated and no actual carcasses are in-hand, cut-in speed adjustments will occur during the two-week period in which all bat fatalities are the highest. Cut-in speeds will be raised at all Project turbines by 0.5 m/s unless the Applicant demonstrates with available data that raising cut-in speeds at fewer turbines will be at least as effective.<br>• Implement Adaptive Management Monitoring[1] during the appropriate season for 2 additional years. Such monitoring will be project-wide unless the applicant demonstrates with available data that monitoring at fewer turbines will be at least as effective.<br>• Review and update, as necessary, monitoring protocols to assess the conservation value of blade feathering.<br>• Implement other appropriate measures to address the identified issue based on |

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|---|---|---|
| | | the best available science.. |
| 3-year rolling average of estimated northern long-eared bat mortality is greater than 6.0. | • Meet and confer with the USFWS in advance of next monitoring period to evaluate available project-specific and/or other data concerning the potential cause of the fatalities, and determine the appropriate scope of additional adaptive management actions. | • Increase cut-in speed by increments of 1.0 m/s with the intent of bringing take down to expected annual levels (2 per year) at all Project turbines, 7 days on either side of the mortality event(s). If take exceedance is calculated and no actual carcasses are in-hand, cut-in speed adjustments will occur during the two-week period in which all bat fatalities are the highest.<br>• If take exceedance is calculated and no actual carcasses are in-hand, cut-in speed adjustments will occur during the two-week period in which all bat fatalities are the highest.<br>• Cut-in speeds will be raised at all Project turbines by 1.0 m/s unless the applicant demonstrates with available data that raising cut-in speeds at fewer turbines will be at least as effective.<br>• Implement Adaptive Management Monitoring[1] during the appropriate season for 2 additional years. Such monitoring will be project-wide unless the applicant demonstrates with available data that monitoring at fewer turbines will be at least as effective.<br>• Review and update, as necessary, monitoring protocols to assess the conservation value of blade feathering.<br>• Implement other appropriate measures to address the identified issue based on |

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|---|---|---|
| | | the best available science. |
| The predicted future take, based on the remaining term of the permit, appears likely to exceed the authorized amount. | • Meet and confer with the USFWS in advance of next monitoring period to evaluate available project-specific and/or other data concerning the potential cause of the fatalities, and determine the appropriate scope of additional adaptive management actions. | • Evaluate with the USFWS adjusting operational protocols to further increase cut-in speeds during the appropriate period to stay within authorized levels of permitted take. Cut-in speeds will be adjusted to a level such that predicted future take does not exceed authorized amount as demonstrated by the Applicant and approved by the Service.<br>• Evaluate with USFWS the installation of proven, cost-effective bat deterrent devices at the turbine or group of turbines implicated in the find, should that technology become commercially available.<br>• Implement Adaptive Management[1] monitoring at all or the adjusted turbines during the adjusted period for 2 additional years. |

[1] Adaptive Management Monitoring consists of three times weekly monitoring at 49 roads and pads (95 m radius from turbine) during the appropriate season.

### 7.4.2 Reductions in Cut-in Speeds

In the event that fatality trajectory indicates that permitted take levels of either species will be exceeded in five years or less, Hoopeston will raise cut in speeds during fall to 5 m/s and implement 3 additional years of monitoring to confirm effectiveness of the response.

### 7.4.3 Reductions in Cut-in Speeds

Reductions in cut-in speed may be justified if adaptive management triggers to raise the cut-in speed (see Section 7.4.1) are met, and the increased cut-in speed results in a greater-than-expected reduction in fatalities. If mortality rates decrease below the level of permitted take, then Hoopeston Wind will coordinate with USFWS if reductions in the cut-in speed are desired to determine appropriate monitoring and cut-in speed adjustments. Prior to such coordination, Hoopeston Wind will develop a report analyzing the amount of take that has occurred and assess the likelihood of exceeding authorized take over the remaining permit term. The parties will then meet and confer to agree up on cut-in speed adjustments at Project turbines and final approval for such reduction would be at the discretion of the Service.

### 7.4.4 Reporting and Notification

Hoopeston Wind shall provide written notification to the USFWS prior to the implementation of any adaptive management response measures set forth in this section. Annual mortality monitoring reports submitted in accordance with Section 7.3.5 of this HCP shall include a discussion of the effectiveness of the measures implemented.

# 8.0 Implementation and Funding Assurances

### 8.1.1 Plan Implementation

The HCP is a mandatory element of the permit application and its implementation will be a condition of the permit. The HCP is designed to be self-implementing, providing the requirements for covered activities, as well as required avoidance, minimization, and mitigation measures.

The applicant requests the benefits of the Federal No Surprises Rule, 63 Fed. Reg. 8859 (Feb. 23, 1998) (codified at 50 C.F.R. §§ 17.3, 17.22(b)(5), 17.32(b)(5)). It generally provides assurances to section 10 permit holders that, as long as the permittee is properly implementing the HCP, and the ITP, no additional commitment of land, water, or financial compensation will be required with respect to Covered Species, and no restrictions on the use of land, water, or other natural resources will be imposed beyond those specified in the HCP without the consent of the permittee. The “No Surprises” Rule has two major components: changed circumstances and unforeseen circumstances.

### 8.1.2 Changed Circumstances

The term “changed circumstances” means changes in circumstances affecting a species or geographic area covered by an HCP that can reasonably be anticipated and that can be planned for (e.g., the listing of new species or a fire or other natural catastrophic event in areas prone to such events).

As discussed in Section 9.6 of the the HCP Handbook (USFWS and NMFS 2016d) with respect to foreseeable changed circumstances, the HCP should discuss measures developed by the applicant to meet such changes over time, possibly by incorporating adaptive management measures for Covered Species in the HCP. HCP planners should identify potential problems in advance and identify specific strategies or protocols in the HCP for dealing with them, so that adjustments can be made as necessary without having to amend the HCP. Hoopeston has identified impacts of WNS on Covered Species, elevated annual take due to changing environmental conditions, the listing of new species, and changed technologies/techniques.

#### 8.1.2.1 Impacts of WNS on Covered Species

The occurrence of WNS and population declines constitute foreseeable changed circumstances that warrant consideration in this HCP. WNS has been confirmed in the Indiana bat OCRU; however, it is difficult to predict at this time what the long-term effects of the disease will be on the Covered Species.

By establishing a biological objective to reduce *Myotis* fatalities by turbine operational restrictions, and by lowering its take estimate over the Permit term (see Section 7.2.1), Hoopeston anticipates that incidental take will not constitute a material negative effect to the population declines that are already occurring due to WNS impacts; i.e., the WNS response has been incorporated into the development of the plan through the biological objectives and the take assessment. Given the uncertainty surrounding WNS and its effects on local bat populations, however, WNS is acknowledged as a changed circumstance that might require an additional response.

The changed circumstance trigger for the Covered Species is a 70% or greater reduction in the Indiana bat OCRU or northern long-eared bat local population based on USFWS data after 2015. Seventy percent is the approximate population reduction for Indiana bats in the Northeast Recovery Unit from 2007-2011, the period that reflects declining populations from WNS effects for that recovery unit (based on best scientific data currently available). That recovery unit has been experiencing effects from WNS since 2006, and we anticipate other recovery units will follow the same trend as WNS continues to spread. This trend is incorporated into the Indiana bat population model being used by USFWS in its biological opinion to analyze effects of the incidental take permit to Hoopeston on the Indiana bat. If, however, at any time the Indiana bat OCRU or local population of northern long-eared bat decreases by 70% or greater than the 2015 level, this will constitute a changed circumstance, as a key assumption of the Indiana bat population model will have been violated.

Upon receipt of the biennial population estimates for the OCRU or northern long-eared bat population, the USFWS will immediately evaluate whether this trigger has been met and will inform Hoopeston if that is the case. In the event that the WNS changed circumstance has been triggered, Hoopeston will conduct

an analysis, in coordination with the USFWS, to determine whether the level of Indiana bat take at the Project is having a material negative effect (after accounting for benefits of mitigation) to the remaining Indiana bat populations in the OCRU or northern long-eared bat population. If the analysis demonstrates that a 35% take reduction is no longer sufficient to prevent material negative effects with the declining population, Hoopeston will implement additional operational restrictions or minimization measures by the next bat spring emergence season (April). These additional measures will be determined through consultation with the USFWS, which will determine what level of take reduction prevents material negative effects. A written plan will be provided by Hoopeston to the USFWS by December, with formal concurrence reached by February 1.. In addition, the effectiveness of these additional measures will be evaluated by additional monitoring, which will be detailed in the written plan.

Examples of different turbine operational protocols that will be considered include changes in the turbine cut-in speed; changes in timing of turbine operating regimes (if timing of Indiana bat or northern long-eared bat fatalities suggests a specific period when these species are at greatest risk); selected turbine curtailment (if evidence indicates specific turbines are causing significantly greater mortality of bats); making operational adjustments based in part on other environmental factors such as temperature; and deployment and testing of bat deterrent technology if suitable technology is available.

#### 8.1.2.2 Elevated Annual Take Due to Changing Environmental Conditions

A primary biological goal of this HCP is to minimize potential take of Covered Species from the Project through on-site minimization measures. Available scientific information indicates that potential take of Indiana bats and northern long-eared bats at the Project as a result of turbine operations could range up to 2.0 bats per year of each Covered Species.

Given uncertainties about the presence of Covered Species in the Project Area, the potential expansion of the species' range, and local population size over time as a result of recovery actions implemented for Indiana bat or possible changes in habitat utilization as a result of climate change, the distribution and occurrence of Covered Species in or near the Project could change (e.g., establishment of a maternity colony near the Project). If the estimated annual take exceeds 2.0 bats per year of each Covered Species after the full adaptive management program has been implemented, Hoopeston assumes that there may have been an increase in the local abundance of Indiana bats or northern long-eared bats, thus triggering this changed circumstance, and Hoopeston will implement the following measure to address this changed circumstance.

Hoopeston and USFWS will meet to agree on potential adjustments to the conservation plan for subsequent years. Adjustments related to the changed circumstance may include focusing on those specific areas of the Project or time of year demonstrating the highest likelihood of take based on the new information. Through this process, Hoopeston will intensively evaluate geographic areas of the site containing the species, including seasonal and temporal presence of the species, and it will develop and implement turbine-specific operational protocols to reduce take in these areas to help ensure the amount of authorized take is not exceeded. Adjustments may also include different turbine operational protocols, including changes in the turbine cut-in speed; changes in timing (duration of night, length of season) of turbine operating regimes (if timing of Indiana or northern long-eared bat fatalities suggests a specific

period when these species are at greatest risk); selected turbine curtailment (if evidence indicates specific turbines are causing significantly greater mortality of bats); making operational adjustments based in part on other environmental factors such as temperature if evidence indicates these adjustments can substantially reduce fatality); and testing and deployment of bat deterrent technology if suitable technology is available.

Measures as described in this change circumstance will be an addition to the adaptive management actions as described in Section 7.4.

### 8.1.2.3 Listing of New Species

In the event of any future listing of bats or other species as threatened or endangered, Hoopeston will confer with USFWS over the need to pursue an amendment to the HCP and ITP. In the event of a future candidate species designation, Hoopeston will similarly confer with USFWS over the need to pursue an amendment of this HCP to include these as Covered Species and incorporate appropriate conservation measures.

Populations of cave-dwelling bats in the eastern and central U.S. may be declining due to WNS or other factors. In particular, little brown bat has experienced declines in recent years due to a variety of factors.

This species and others may occur in the Project Area. If one or more of these species become listed during the permit term, Hoopeston will comply with the ESA, and Hoopeston may seek to include such newly listed species as Covered Species in the ITP via a permit amendment...

### 8.1.2.4 Changed Technology/Techniques

Over the 30-year life of the permit, it is reasonably foreseeable that advances in wind turbine technology and techniques to avoid or minimize the mortality of bats will be made. This could include items such as bat deterrents, increased knowledge of the relationship between weather conditions and fatalities, and turbine design changes, as well as other advancements. These examples are described in detail below.

The use of acoustic deterrents is being studied for reducing bat mortality at wind turbines; however, this technology is currently not available on a large scale for use in wind energy facilities. Over time, other techniques that otherwise deter bats from collisions with turbines may prove effective in reducing bat mortality (e.g., changes in turbine colors, habitat modifications, etc.). Hoopeston may implement bat deterrents if approved by the USFWS and provided that this technique is proven and cost effective and meets the biological goals of this HCP.

A growing body of evidence suggests that bat activity is low at low temperatures, and particularly that nightly Indiana bat activity is correlated with temperature (USFWS 2007). Several studies have shown that bats and their prey become constrained by falling temperatures as autumn progresses (USFWS 2007). USFWS guidance states that mist-netting is unlikely to be successful when ambient temperatures are below 50° F (10° C) due to a sharp decrease in bat activity (USFWS 2007). This temperature is also understood to be the general threshold for hibernation by Indiana bats (USFWS 2007).

A study of the relationship between weather conditions and bat mortality at the Fowler Ridge wind energy facility in Indiana found that bat casualty rates were highest on nights with higher mean temperature and increasing variance in temperature (Good et al. 2011). Specifically, 91% of all bat fatalities during the fall migration period occurred on nights with mean nightly temperatures above 68° F (20° C). Regression analysis indicated that bat mortalities increased by 15% for every 1.8° F (1.0° C) increase in average nightly temperature at the Fowler site (Good et al. 2011). These data indicate that it may be possible to allow greater turbine operation at temperatures below 50° F (10° C), or other temperature to be determined based on future research, and avoid risk to Indiana bats as well as greatly reduce risk to all bats in general. Hoopeston may implement greater turbine operations at lower temperatures; if approved by the USFWS, this technique is proven and cost effective and meets the biological goals of this HCP.

Changes in turbine configuration, technology such as new turbine and/or blade designs, or automated changes in turbine operation triggered by monitoring parameters correlated to high risk to bats (such as weather variables or detection of high bat activity near the turbines) may also prove useful in reducing bat mortality at wind turbines. If new techniques or technology become available that cost less to implement than the currently proposed minimization measures, Hoopeston will evaluate whether to replace the measures detailed in the HCP and then take action if Hoopeston determines that the new measures are cost-effective, feasible to implement, and meet the biological objectives of the HCP. Although some technologies may be cost-effective, other factors may render them infeasible (e.g., topography, site constraints, safety, legal constraints). Additionally, although some measures may cost less to implement, timing may play a factor in whether such technologies are cost-effective to implement (i.e., it may not be financially prudent to change approaches in the latter years of the permit, especially if recorded take is negligible).

Any changes in techniques or technologies will only be considered if it has been demonstrated in an acceptable scientifically-based study, and has been approved by the USFWS as the best available science, compliant with the HCP biological goals and objectives, and will not require an increase in the take authorized for the Project.

#### 8.1.2.5 Post 4(d) Adaptive Management for Northern Long-Eared Bat

Should the final ESA 4(d) rule for NLEB exempting incidental take occurring at wind projects from Section 9 take prohibitions (81 Fed. Reg. 1900; USFWS 2016c) be overturned or reversed, resulting NLEB take prohibition, the following NLEB-specific adaptive management triggers and responses as described in Table 8-1 will be implemented.

**Table 8-1. Northern Long-eared Bat Adaptive Management Triggers and Responses if the species becomes subject to Section 9 Take Prohibitions in the Future.**

| Trigger for Adaptive Management | Immediate Response | Adaptive Management Response |
|---|---|---|
| 3-year rolling average of estimated northern long-eared bat mortality ranges from 2.0 to 4.0. | • Meet and confer with USFWS in advance of next monitoring period to evaluate available project-specific and/or other data on the potential cause of the fatalities, and determine the appropriate scope of additional adaptive management actions. | • Increase cut-in speed by increments of 1.1 mph (0.5 m/s) with the intent of bringing take down to expected annual levels (2 per year) at all Project turbines 7 days on either side of the mortality event(s). If take exceedance is calculated and no actual carcasses are in-hand, cut-in speed adjustments will occur during the two-week period in which all bat fatalities are the highest. Cut-in speeds will be raised at all Project turbines by 0.5 m/s unless the Applicant demonstrates with available data that raising cut-in speeds at fewer turbines will be at least as effective.<br>• Implement Adaptive Management monitoring[1] during the appropriate season for 2 additional years. Such monitoring will be project-wide unless the applicant demonstrates with available data that monitoring at fewer turbines will be at least as effective.<br>• Review and update, as necessary, monitoring protocols to assess the conservation value of blade feathering.<br>• Implement other appropriate measures to address the identified issue based on the best available science. |

| | | |
|---|---|---|
| 3-year rolling average of estimated northern long-eared bat mortality is greater than 4.0. | • Meet and confer with USFWS in advance of next monitoring period to evaluate available project-specific and/or other data concerning the potential cause of the fatalities, and determine the appropriate scope of additional adaptive management actions. | • Increase cut-in speed by increments of 1.0 m/s with the intent of bringing take down to expected annual levels (2 per year) at all Project turbines, 7 days on either side of the mortality event(s). If take exceedance is calculated and no actual carcasses are in-hand, cut-in speed adjustments will occur during the two-week period in which all bat fatalities are the highest.<br>• If take exceedance is calculated and no actual carcasses are in-hand, cut-in speed adjustments will occur during the two-week period in which all bat fatalities are the highest.<br>• Cut-in speeds will be raised at all Project turbines by 1.0 m/s unless the applicant demonstrates with available data that raising cut-in speeds at fewer turbines will be at least as effective.<br>• Implement Adaptive Management monitoring[1] during the appropriate season for 2 additional years. Such monitoring will be project-wide unless the applicant demonstrates with available data that monitoring at fewer turbines will be at least as effective.<br>• Review and update, as necessary, monitoring protocols to assess the conservation value of blade feathering.<br>• Implement other appropriate measures to address the identified issue based on the best available science. |

| | | |
|---|---|---|
| The predicted future take of northern long-eared bat, based on the remaining term of the permit, is likely to exceed the authorized amount. | • Meet and confer with USFWS in advance of next monitoring period to evaluate available project-specific and/or other data concerning the potential cause of the fatalities, and determine the appropriate scope of additional adaptive management actions. | • Evaluate with the USFWS adjusting operational protocols to further increase cut-in speeds during the appropriate period to stay within authorized levels of permitted take. Cut-in speeds will be adjusted to a level such that predicted future take does not exceed authorized amount as demonstrated by the Applicant and approved by the Service.<br>• Evaluate with USFWS the installation of proven, cost-effective bat deterrent devices at the turbine or group of turbines implicated in the find, should that technology become commercially available.<br>• Implement additional Adaptive Management Monitoring[1] at all or the adjusted turbines during the adjusted period for 2 additional years. |

[1] Adaptive Management Monitoring consists of three times weekly monitoring at 49 roads and pads (95 m radius from turbine) during the appropriate season.

### 8.1.3 Unforeseen Circumstances

Unforeseen circumstances are defined as changes in circumstances affecting a species or geographic area covered by a conservation plan that could not reasonably have been anticipated by plan developers and the USFWS at the time of the negotiation and development of the plan and that result in a substantial and adverse change in the status of the Covered Species (50 C.F.R. § 17.3).

The USFWS bears the burden of demonstrating that unforeseen circumstances exist using the best available scientific and commercial data available while considering certain factors (50 C.F.R. §§ 17.22(b)(5)(iii)(C)). In deciding whether unforeseen circumstances exist, the USFWS will consider, but not be limited to, the following factors (50 C.F.R. §§ 17.22(b)(5)(iii)(C)):

1. The size of the current range of the affected species;

2. The percentage of range adversely affected by the HCP;

3. The percentage of range conserved by the HCP;

4. The ecological significance of that portion of the range affected by the HCP;

5. The level of knowledge about the affected species and the degree of specificity of the species conservation program under the HCP; and

6. Whether failure to adopt additional conservation measures would appreciably reduce the likelihood of survival and recovery of the affected species in the wild.

In negotiating unforeseen circumstances, the USFWS will not require the commitment of additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources beyond the level otherwise agreed upon for the species covered by the HCP without the consent of the permittee (50 C.F.R. §§ 17.22(b)(5)(iii)(A)). If additional conservation and mitigation measures are deemed necessary to respond to unforeseen circumstances, the USFWS may require additional measures of the permittee where the HCP is being properly implemented only if such measures are limited to modifications within conserved habitat areas, if any, or to the HCP's operating conservation program for the affected species, and maintain the original terms of the plan to the maximum extent possible (50 C.F.R. §§ 17.22(b)(5)(iii)(B)). Additional conservation and mitigation measures will not involve the commitment of additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources otherwise available for development or use under the original terms of the conservation plan without the consent of the permittee. Notwithstanding these assurances, nothing in the No Surprises Rule "will be construed to limit or constrain the USFWS, any federal agency, or a private entity, from taking additional actions, at its own expense, to protect or conserve a species included in a conservation plan" (50 C.F.R. §§ 17.22(b)(6)).

### 8.1.4 Funding Assurances

The ESA implementing regulations provide that an applicant for an ITP must establish that sufficient funding will be available to implement the HCP, including the requirements to monitor, minimize, and mitigate the impacts from the taking.

Measures requiring funding in an HCP typically include on-site measures during project implementation or construction (e.g., monitoring, surveys, research), as well as on-site and off-site measures required after completion of the Project or activity (e.g., revegetation of disturbed areas and acquisition of mitigation lands). For relatively small to medium-size projects involving only one or two applicants, the funding source is usually the permittee, and funding is provided immediately before project activities commence, immediately after, or in stages.

Hoopeston will provide such funds as may be necessary to carry out its obligation under the HCP. Hoopeston, and any successor in interest, should notify the Service if the Permittee's funding resources have materially changed, including a discussion of the nature of the change. To achieve this requirement, Hoopeston will provide two separate assurances that it will carry out all of its obligations under the HCP. First, concurrent with permit issuance, Hoopeston will provide USFWS with evidence that it has signed a contract for the first year of monitoring and reporting. Additionally, within one year of ITP issuance, Hoopeston will provide one or more irrevocable, non-transferable standby letters of credit issued by (i) a U.S. commercial bank or (ii) a U.S. branch of a foreign commercial bank with sufficient assets in the U.S., as determined by USFWS, with either such bank having a credit rating of at least A- from S&P or A3 from Moody's in the amount of $607,200. Hoopeston will maintain this financial assurance for the duration of the ITP and provide USFWS with evidence of its establishment. The amount of financial assurance is based on the estimated HCP implementation costs for Years 1-30 of the ITP, including the intensive monitoring effort, spring monitoring, check-in monitoring, annual monitoring, mowing, and reporting (see Table 8.1 for details). The amount of the financial assurance may be reduced over time commensurate with remaining financial obligations in the HCP by mutual agreement of the parties.

Hoopeston will fund an escrow account in the amount of $450,000 to facilitate off-site conservation actions (i.e. 150 acres for mitigation projects) during the term of the ITP. Hoopeston has entered into an agreement with a local nonprofit to undertake mitigation on its land (Apex 2016). Hoopeston will deposit one hundred percent of the $450,000 in a segregated escrow account within ninety (90) days after issuance of the ITP, so no ongoing financial security will be required to guarantee its fulfillment of this obligation. The Parties may agree in writing to extend the deadline for Hoopeston Wind to make a payment of $450,000 by up to an additional 90 days. In requesting the extension, Hoopeston Wind will outline the reasons for the extension. As described above, Hoopeston Wind will consult with USFWS over selected project(s) that satisfy the requirements of Section 7.2 before Hoopeston directs that money be disbursed (see Section 2.2.2).

Money from the conservation fund will be used by Hoopeston Wind to implement mitigation activities for the Covered Species, initial mitigation project documentation and monitoring efforts, and contingencies needed through adaptive management and changed circumstances.

The HCP and all of the obligations contained herein shall be binding on and shall inure to the benefit of the Parties hereto and their respective successors and assigns.

**Table 8-2. Funding Assurances Budget.**

(Note: All costs are in 2016 dollars, not adjusted for inflation.)

| Task | Estimated Cost | | Major Assumptions/Cost Basis |
|---|---|---|---|
| | Per year | Total | |
| Intensive monitoring Years 1-3 (fall) | $95,000[1,2] | $285,000 | Fall searches include 15 full plot turbines and 34 roads and pads, searches twice per week. |
| Intensive monitoring Year 1-3 (spring) | $80,000[1,2] | $240,000 | Spring searches include weekly searches of 5 full plots and 44 roads and pads for one year |
| Adaptive Management Monitoring | $45,000 | $TBD | Three times weekly roads and pads during season triggered, based on changed circumstances or adaptive management |
| Annual monitoring Years 1-30 | $45,000[1,2] | $1,170,000 | Road and pad weekly searches, 6.5 months per year; performed by O&M personnel |
| Check-in Monitoring Years 15-16 (fall and spring periods) | $140,000[1,2] | $420,000 | Monitoring of 5 full plots and 44 roads and pads, weekly during the spring and twice weekly during the fall season |
| Annual meetings Years 1-30 | $6,000 | $180,000 | Conducted by consultant Years 1-3 and 15-16, conducted by Hoopeston all other years |
| Annual reports[1, 3] | Included above | | Prepared by consultant Years 1-3 and 15-16, prepared by Hoopeston all other years |
| Vegetation clearing Years 1-3 | $20,000 | $60,000 | 5 spring, 15 fall plots |
| Vegetation clearing Years 15-16 | $12,700 | $38,100 | 5 plots in spring and fall |
| Annual O&M training[3] | Included above | | |
| Land Restoration Costs for Off-site Habitat Conservation[4] | | $450,000 | 150 acres, $3,000/acre |
| Administrative costs | | $70,500 | Consultant expenses; contracting |
| Long-term management costs | | $67,500 | Up-front contribution of up to 15% of restoration costs |

[1] Searcher efficiency and carcass removal trial costs included in monitoring costs.
[2] Reporting costs included in monitoring costs.
[3] Search and data entry training for O&M personnel included in intensive monitoring costs (Hoopeston and consultant searchers trained concurrently).
[4] One-time payment to be made within 90 days of the issuance of the ITP.

# 9.0 List of Preparers

This document was prepared in consultation with the USFWS. The following companies and key individuals contributed to its preparation.

| Company | Key Preparers |
|---|---|
| Apex Clean Energy, Inc. | Dave Phillips |
| K&L Gates LLP | Jim Lynch |
| Stantec Consulting Services Inc. | Terry VanDeWalle, Molly Stephenson |

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# Appendix A